

Viking Age Headcoverings from Dublin

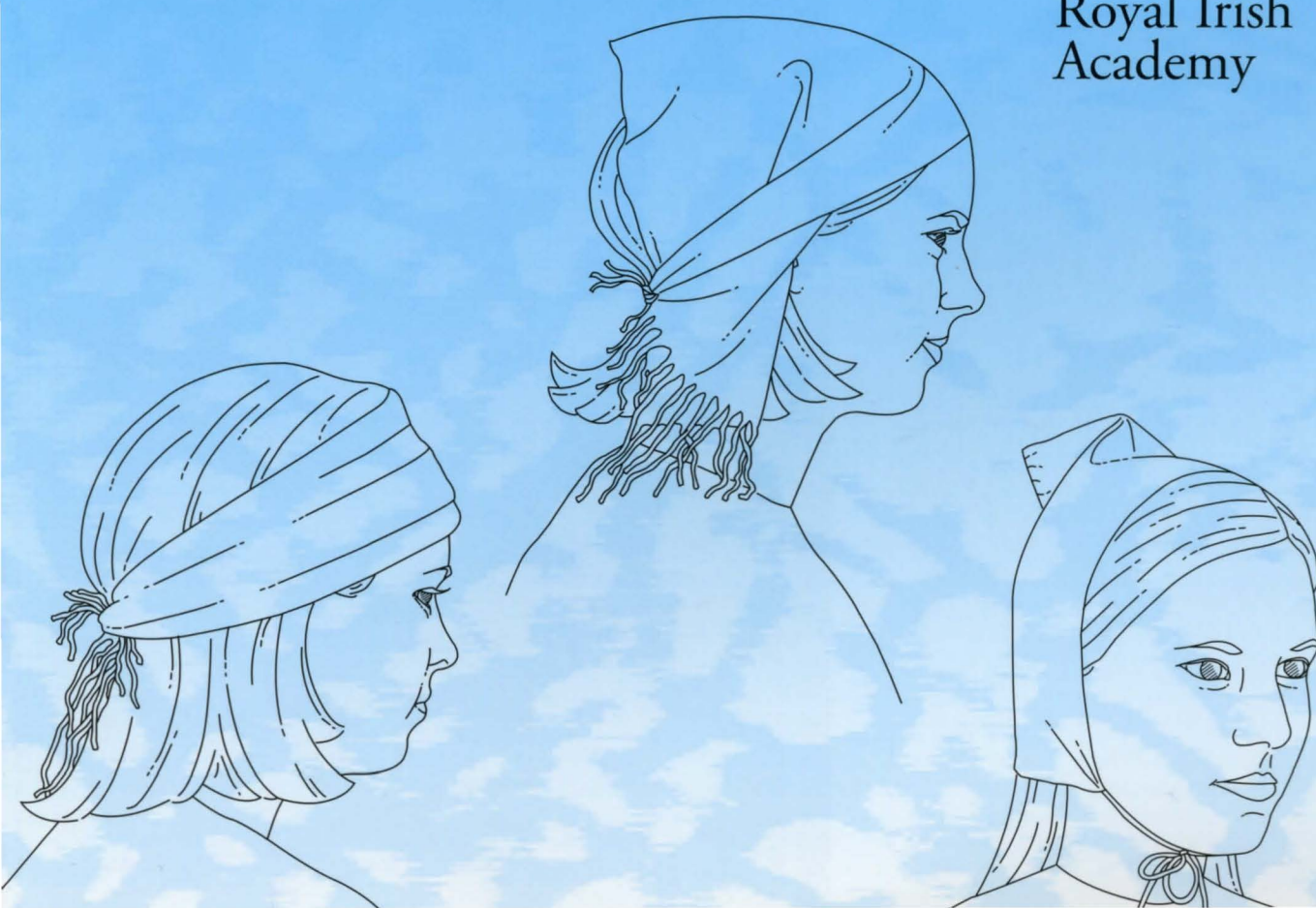
National
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ELIZABETH WINCOTT HECKETT

Medieval
Dublin
Excavations
1962–81

Ser. B, vol. 6 (2003)

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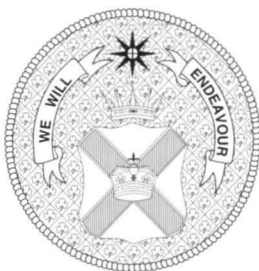
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ELIZABETH WINCOTT HECKETT



ROYAL IRISH ACADEMY
Dublin 2003

Published by the Royal Irish Academy
for the National Museum of Ireland
and the Royal Irish Academy

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Elizabeth Wincott Heckett—Viking Age Headcoverings from Dublin

ISBN 0-9543855-5-1 hardback

British Library Cataloguing-in-Publication Data.
A catalogue record for this book is available
from the British Library.

Typeset by Redbarn Publishing, Skeagh, Skibbereen, Co. Cork

Printed in Ireland by Betaprint Ltd, Dublin

To my mother,
JOYCE WINCOTT,
and to the memory of my father,
HAROLD WINCOTT

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Acknowledgements

I would particularly like to thank Elizabeth Twohig, Department of Archaeology, University College Cork, and Frances Pritchard, Whitworth Art Gallery, University of Manchester, whose constant encouragement and skilled advice enabled me to complete this research. Frances Pritchard, who is the textile consultant for the finds, surveyed the Fishamble Street and John's Lane textiles and subsequently analysed and published significant findings. She identified the similarities of the group studied here and suggested to Dr Patrick Wallace that this material be made available to me.

I am grateful to Dr Wallace, who as Director of the National Museum of Ireland gave me access to the material and generously helped with information. Almost all the pieces catalogued and discussed here came from the Fishamble Street and John's Lane excavations, which were directed by him for the National Museum of Ireland. I also thank Frances Pritchard for the identification of some fibres, and for communicating unpublished information, as did Helen Bennett, Edinburgh, Finbar McCormick, Belfast, and Penelope Walton Rogers, York. L. Masschelein, Brussels, and Penelope Walton Rogers were good enough to carry out the dye analysis of the textiles. Thanks are due to Patrick Sleeman and Hugh Doran for the analysis of hairs caught on the textiles. I am indebted to Lise Bender Jørgensen for her encouragement and constructive criticism.

Raghnall Ó Floinn, Rachel McNicholl, Léan Ní Chuilleanáin and Andy Halpin have been very supportive during the publication process, and I am deeply appreciative of the contribution of Niamh O'Broin for the illustrations, which were commissioned by the National Museum of Ireland. These include detailed catalogue drawings, text illustrations and graph computerisation. Kristina Ryan and Tara Woods, wearing headdress reconstructions, kindly sat for the original drawings for Figs 3, 4a and 13. I am grateful to Noreen O'Donoghue for photographing the textiles, to Olive Simonin for her help in producing the Tables, and to Sarah Milliken for her thoughtful comments on the text. Figure 82, depicting weaving tools, was drawn by Patricia Johnson. The work done by Anne Morrell in the field of sewing techniques has been invaluable.

Special thanks are due to Oxana Sekatcheva and her family for making the arrangements to source the illustration of the fresco of King Yaroslav's children in St Sophia Cathedral, Kiev.

I also remember gratefully the encouragement of the late Professor M.J. O'Kelly and Claire O'Kelly, and that of Professor Peter Woodman, Department of Archaeology, University College Cork. My mother, son and daughters showed patient and total support, as did all my family; I valued their help immensely. Any errors are my own.

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Summary

This study is an analysis of 68 textiles (listed under 61 catalogue numbers) related in type, weave and function from tenth- and eleventh-century levels at Fishamble Street/John's Lane and mid-eleventh- to mid-late twelfth-century levels at High Street, Dublin. The data provide a foundation from which to explore the relationship between the textiles and the community that used them.

A complete catalogue is presented, including scale-annotated diagrams and a selection of representative photographs. The catalogue is divided into two sections relevant to the types of headcovering, each accompanying the appropriate text. Context of the textiles is considered in relation to sites and particular conditions that affect the survival of cloth.

The use of the textiles for headcoverings is discussed and detailed descriptions are given. Results show that a variety of different styles was in use in Hiberno-Norse Dublin.

Many of the silk and wool pieces represent caps, bands and scarves of light, delicate fabrics. The number surviving suggests that the cloth was relatively easily available to the townspeople. Since the caps are consistently made in the same way, a 'pattern' existed. The international context of the headcoverings is discussed. Similarities between caps found in Dublin, York and Lincoln are explored.

The cloth technology used is then described. The wool and silk pieces are discussed—an analysis of their methods of manufacture, the yarns used and the construction of weave, including headings, selvages and fringes. Comparisons are made between the Dublin textiles and those from other sites. The silk and wool textiles are analysed for similarities and differences. Looms, loompieces and cloth size are considered in their cultural context.

Sewing practices are described. Commerce, trade routes and likely places of origin of raw materials and cloth manufacture are considered. Then, aspects of Viking Age dress in relation to the headcoverings are discussed. In conclusion, a résumé of the analysis is given.

The tables are presented after the main text, together with the appendices, a glossary, references and the concordance of sample numbers. The appendices include the more technical aspects of the analysis. Appendices 1 and 2 cover catalogue conventions and methods of analysis and conservation. Appendix 3 describes medieval dyeing techniques and the results of dye analysis of selected pieces. Appendix 4 presents the analysis of the material using the Munsell Color Charts. Appendix 5 discusses the human and animal hairs found on some of the textiles.

Introduction

The Viking Age town

The house sites where most of the textiles were found lie beneath present-day Fishamble Street and John's Lane. As many as thirteen or more house foundations overlay one another on fourteen plots in Fishamble Street (Wallace 1992, 5) (Figs 1 and 2). They were excavated under the direction of Dr Patrick Wallace for the National Museum of Ireland between 1975 and 1976 and (mainly) between 1977 and 1981. They were located beside the ancient estuary of the River Liffey as it was before reclamation works created the modern shoreline. Organic soil between two and five metres deep sealed the remains of timber buildings and the contents of pits associated with them. Damp, anaerobic conditions accounted for the excellent preservation of most of the wool and silk cloth. However, comparatively little linen survived owing to the particular conditions on the site (and generally in north-western Europe), whereby fibres made from animal protein can survive in good order while cellulose vegetable fibres cannot. Since seeds and seed-cases of *Linum* cf. *usitatissimum* have been widely found in the houses and pits, as well as tools associated with the preparation of linen yarn, it is very likely that linen cloth was produced and used (Geraghty 1996, 17, 22–3, 29, 47–8).

Some houses on the site showed specialised use, one perhaps being the well-established workshop of a jeweller (Wallace 1984, 124). However, the textile remains described were not found together in a way that suggests industrial production.

The plots in Fishamble Street with houses fronting on the street and small buildings at the back nearer the waterfront may represent the physical traces of people directly involved in trade. Tenth-century English coins from mints at Chester, Norwich, London and Exeter found here indicate trading activities, as do the many lead weights, pans and scales, indispensable to the merchant (Wallace 1984, 125–6; Wallace 1985, 137).

The excavation at John's Lane uncovered an eleventh- to twelfth-century house in which textiles were also found. This site lies to the south of the waterfront embankments of the same date (Wallace 1985, 106).

In 1988 the contents of a Viking Age pit in nearby High Street were excavated by Declan Murtagh (Gaimster *et al.* 1990, 229). Among other textiles a further two wool caps were found.

The group analysed here consists of 41 wool and 27 (including patches and composite items) silk textiles, ranging in size from 40mm × 25mm to 870mm × 240mm. They were selected from the c. 2000 textiles found in the Dublin excavations because of their similarity of structure and possible function and because they were sufficient to provide the statistical basis for useful analysis and detailed cataloguing. The Dublin textile finds are remarkable for their quantity and in many cases for their good state of preservation.

All the pieces described here were woven in a tabby (or plain) binding system, and some of the loom pieces could clearly be seen to have been made into headcoverings, caps and scarves. Following an examination of recognisable items, the small fragments were compared for corresponding characteristics and design features. This identified some as also belonging to headcoverings, the textiles being in a light, plain weave of the right size, weight and appearance for this purpose. Except for one group of densely woven silks, they seem too fine to serve as fabric for dresses or tunics.

The textiles from Fishamble Street and John's Lane are not related in distribution or context. They were deposited between the mid-tenth and late eleventh centuries. One piece from High Street is from a mid- to late twelfth-century level. A firm date was established by a penny of Aethelstan (AD 924–40), which was found with the silk cap Dublin Headcovering (hereafter DHC) 40.

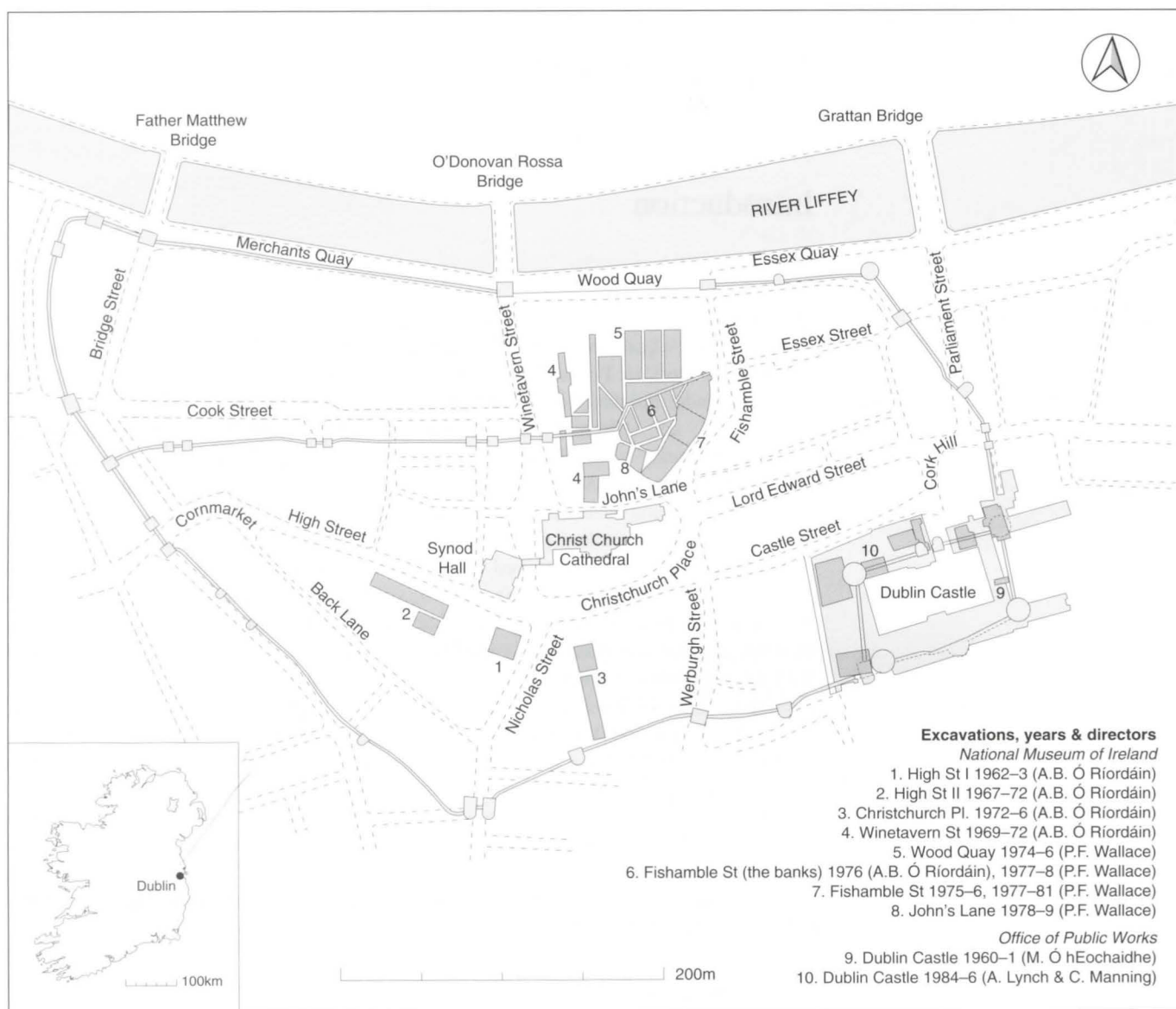
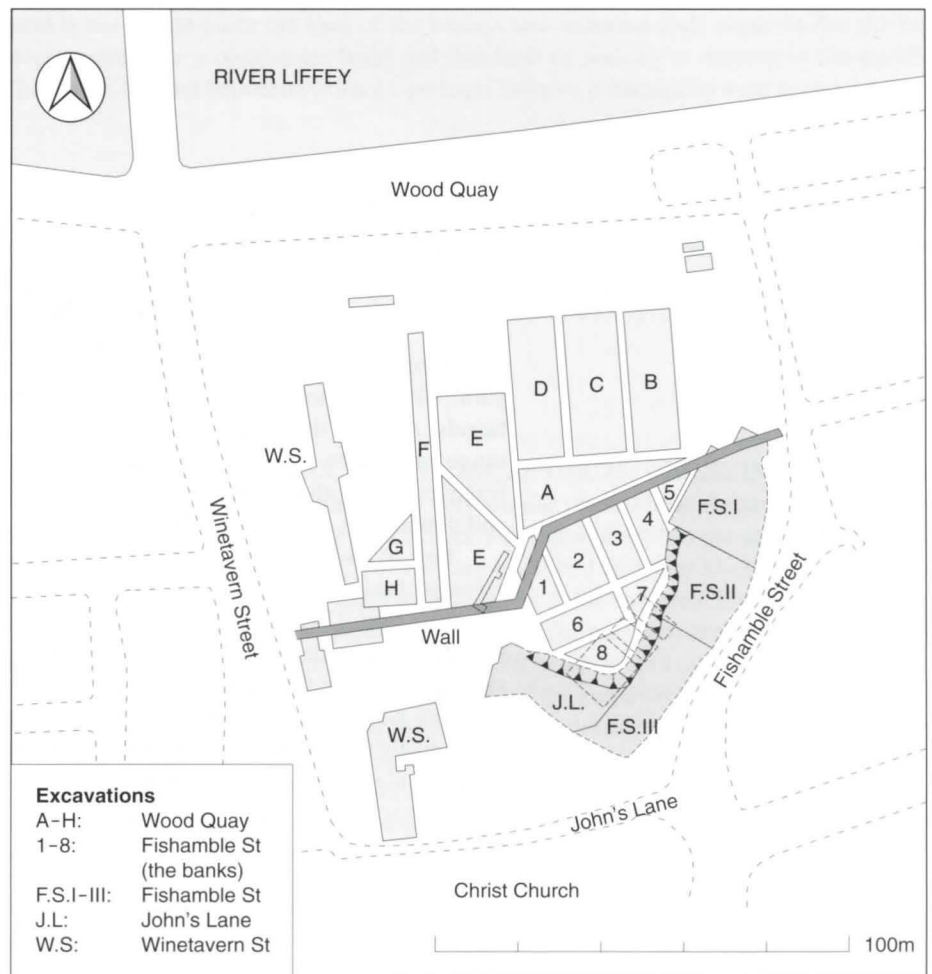


Fig. 1. Plan of the Viking Age and Norman town of Dublin showing the National Museum of Ireland excavations 1962–86.

Context and deposition of textile remains

It is important to understand something of the context in which textiles may be found in excavations. The pattern of use is complex, since textiles represented particularly mobile and valued possessions. Even if it is shown that luxury textile remains are linked with specific buildings, there are pitfalls in suggesting that artefacts found there must have belonged to high-ranking residents. We cannot assume that the person who last used expensive textiles was the original owner and so was wealthy. Historically, the pattern of cloth use has involved handing down all sorts of clothes from mistress and master to child or servant. The final period of use, perhaps even as a rag, may be far removed from the original function and location. The careful patching seen in some of the silk caps and the piecing together of cloth may represent this secondary use, or it may be an indication of a thrifty and housewifely attitude in Dublin households.

Fig. 2. Plan of Fishamble Street/John's Lane showing 1975-86 excavations.



The headcoverings

There are five types of possible headcoverings among the wool and silk pieces. Examples of the different types are as follows:

- (1) Sixteen textiles of a scarf type.
- (2) One long veil-like textile.
- (3) Two long bands (one likely and one possible example).
- (4) Two knotted silk bands.
- (5) Eight short bands (five likely and three possible examples).
- (6) Sixteen sewn and fitted caps (twelve definite and four possible examples).

Of the total sample, 74 per cent of the pieces belong to one of these five types. It is likely that other pieces in the group also may be headcoverings. Examination by microscope showed that 34 of the textiles had hairs caught in the weave. The structure of the hairs had in most cases deteriorated so greatly that identification was impossible, but in three they were identified as human. Since they were on pieces not otherwise clearly seen to be headcoverings it suggests that an even higher proportion than 74 per cent were used in this way.

DHC29 (Fig. 38) may be part of either a scarf or a band.

Scarves and bands

Scarf type

Ten wool and six silk pieces can be described as being of the scarf type, all of Z/Z-spun yarn. With one exception they have fringes with decorative grouping of warp threads into tassels. As only three silk (and no wool) pieces have survived complete, no particular range of lengths can be established. Three of the wool scarf textiles are quite small fragments of cloth, although most of DHC1 (Pl. I, Fig. 11) still exists. Technical details and dimensions are given in Table 1.

Few of these scarf-type pieces were stitched: DHC5 (Fig. 15) had a small part of the selvedge folded into a hem, and a single stitch was noted in DHC16 (Fig. 26). The large silk scarf DHC12 (Pl. II, Fig. 22), showing traces of the blue dye indigotin, is still knotted together at one side of the ends, allowing the rest of the fringes to fall freely. Although the cloth is broken in the middle, not much seems to be missing. It could have been worn in different ways, including as a cap with the knot under the chin and the fringes falling decoratively to the shoulders. The back would be left open. As will be seen later, this would give a similar effect to that of some of the caps where they may not have been sewn up the back. The scarf could also be worn as a cap but twisted and knotted at the nape of the neck, as a headband or as a shoulder scarf (Fig. 3).

The three complete silk loompieces are woven in a crêpe-type cloth; two were dyed red with madder. Although the wool scarves were made from broadly similar yarns to those used for the wool caps, the average yarn diameters are slightly finer. There is a bigger difference in the width of the cloth used for scarves and for caps. The range for the scarves is greater: six are between 210mm and 240mm, while none of the caps is more than 180mm wide.

Veil-type silk

The silk DHC17 (Pl. III, Fig. 27, Table 1), with overall dimensions of 870mm (minimum) × 240mm, is the largest piece in the sample. It was dyed purple and the ends were hemmed. It is the only piece that may have been large enough to be worn as a wimple (Fig. 4a). As it survives, however, it is not big enough to be used in that way. Since the cloth is broken, perhaps it was originally longer, but the width is definite because both selvedges are there. This width of 240mm is not enough to cover the back of the head, although headdresses shown in contemporary Anglo-Saxon manuscripts seem to do so (e.g. that shown in Fig. 4b). DHC17 could have been pinned into place to cover the forehead and neck. If it was worn centred on the head and held in place by a metal fillet or cloth headband the silk would reach a little below the shoulders.

Bands of wool and silk

There are six wool and five silk bands (two of the latter are composite pieces). In addition, one wool piece, DHC29, may be either a band or a scarf. Table 2 is a summary of technical details and dimensions.

Long silk bands

DHC26 (Fig. 35) is a long band with the ends knotted together and DHC25 (not illustrated) is a long band without knots. Both bands are of silk, c. 580mm long and, respectively, 80mm and 100mm wide, woven from Z/Z twist yarn. Although the knotted

band is not in one piece the look of the broken and distorted ends suggests that the two pieces were once a continuous band and that little or nothing is missing in the middle. The length of cloth between the knots, perhaps 390mm, is enough to wear round the head.

Knotted silk bands

DHC27 (Fig. 36) and DHC28 (Fig. 37) are made from strips of silk knotted together of a suitable length to tie round the head. The first is made from two pieces that measure 390mm, the second from three strips that would stretch to 480mm. These headbands may have been used both on their own and to keep other headcoverings in place. Hairs caught in the cloth of DHC28 may be human.

Short wool and silk bands

Six short wool bands (DHC18, DHC19, DHC20, DHC21, DHC22, DHC23—Figs 28, 29, 30, 31, 32 and 33) are all made from very similar yarns whose diameters fall between 0.16mm and 0.29mm and centre on 0.22mm. The thread densities per centimetre are also similar, with between 11–15 and 14–19 warp ends, and between 11–13 and 17–21 weft picks, in each system. DHC18 and DHC21 appear to be complete loompieces; both are c. 385mm long. DHC18 has looped warp ends under one hem and may also have had them at the other. DHC21 has fringes tucked into hems at both ends.

DHC24 (Pl. IV, Fig. 34), a short silk band of the crêpe-type weave, is 385mm long \times 120mm wide. As the hems of this band are still stitched, it is impossible to see signs of starting and ending loops. This means that we cannot tell whether this is a loom piece or whether the ends were cut before being hemmed. The band has a fine, delicate appearance and the cloth is quite unblemished. Because it is intact with both selvages unbroken it was inappropriate to take a sample for dye analysis. Found with the band was

Fig. 3. *Different ways of wearing scarf DHC12.*

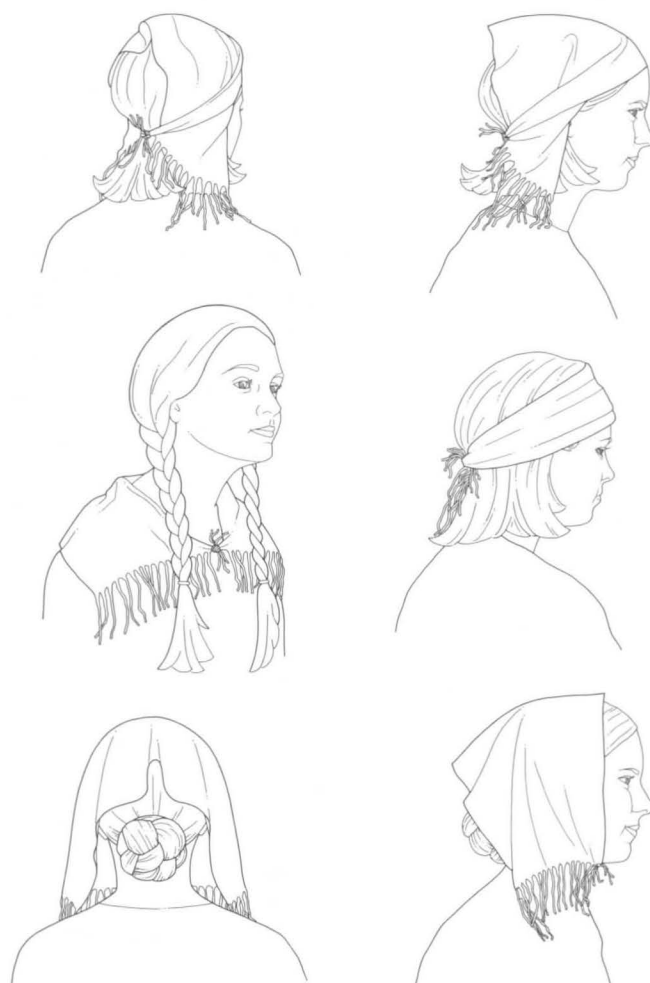


Fig. 4a (right) and b (below). (a) Veil type cloth DHC17 and (b) Anglo-Saxon wimple, from the Annunciation, Benedictional of St Aethelwold, Bishop of Winchester, AD 975–80.



Comparisons for scarves and headbands

a separate knot consisting of two pieces of flossy yellowish silk yarn the right size and shape to tie the band at the nape of the neck. Both ends of the band are still gathered inwards as if such ties had been sewn to the bunched-up fabric. This can also be seen on one end of wool band DHC23 (Fig. 33).

It is impossible to prove outright that these bands were worn on the head, but judging by the lightness of the cloth and the gathering of the ends of some of them, it seems likely. The bands show none of the wear marks associated with cloth wristbands and do not seem sturdy enough to have served this purpose. That the long silk band DHC26 (Fig. 35) was left knotted supports the idea that it may have been pulled on and off as a headband rather than being used as a belt. Indeed, the length between the knots would have fitted only a very small child. Human hair was found caught in DHC16 (Fig. 26), reinforcing the idea that it was a headcovering.

An unpublished textile, E43:1805 from the High Street, Dublin excavations, falls outside this analysis but is nonetheless pertinent. It is a tabby weave cloth of exactly the same type and weave as those described here (Z/Z, mt/mt, 0.35/0.35, 12–14/12–14) and is very likely a band or perhaps a small child's cap. There may be other relevant examples from these excavations of 1962–73.

There seem to be no precisely comparable wool pieces from contemporary archaeological contexts, but there is some pictorial and written documentation and some archaeological evidence of other types of headbands.

Pictorial and written documentation from the tenth to the thirteenth centuries

In Kells Priory, Co. Kilkenny, a thirteenth-century female stone head effigy shows a fillet or headband holding a short folded cloth headdress in place (Hunt 1974, fig. 15, 181) (Fig. 5). The style of the accompanying sculpture of a male head strongly suggests that the couple were Irish.

A Byzantine enamelled plaque of the late tenth or early eleventh century represents the Archangel Michael with a jewel-encrusted band, possibly of silk, with two cloth streamers clearly seen on each side of the neck (Fig. 6). This motif is echoed in Anglo-Saxon manuscripts of the late tenth and early eleventh centuries, where angels are drawn with what look like cloth diadems (Oxford Bodleian Library, MS Bodley 155 f 93b). In the York Gospels the Evangelist Luke wears a headband (York Chapter Library, MS Add. I f85b). A painting of the Harrowing of Hell in the mid-eleventh-century Tiberius Psalter (Fig. 7) depicts Christ wearing a swathed and knotted headcloth while vigorously dealing with demons. It is still common to wear a headband while working or exercising.

Some information on headbands and fillets worn by Anglo-Saxon women in this period is given in the eleventh-century will of Wynflaed (Owen 1970). These include the fillet, known by the words *binde*, *binden*, which was apparently visible from ear to ear.

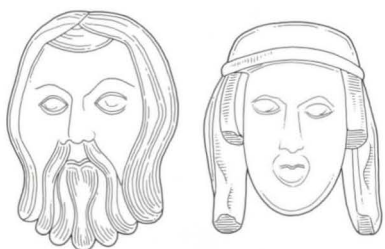


Fig. 5. Two heads on head slab, Kells, Co. Kilkenny, late thirteenth century AD.

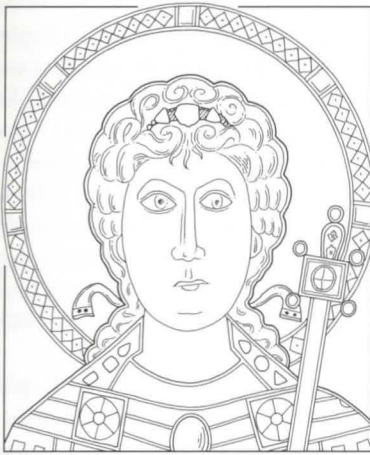


Fig. 6. Detail from plaque of St Michael, Byzantine, tenth or eleventh century AD (Tesoro no. 46, St Mark's, Venice, silver-gilt and cloisonné enamel).



Fig. 7. Detail of the Harrowing of Hell, Tiberius Psalter, Anglo-Saxon, eleventh century AD (British Library, Cotton MS Tiberius C vi f14).

Fig. 8. Unfinished painting of the daughters of Ruel (British Library, Cotton MS Claudius B IV), Anglo-Saxon, eleventh century AD.

This is glossed from the *Monasteria Indicia* as headgear typical of secular (married) women. There are, however, few illustrations of women wearing headbands or fillets (Owen 1970, 214–15). One that does exist, although in an unfinished state, is BL Cotton MS Claudius B IV f76, showing the daughters of Ruel in Noah's ark wearing draped cloth veils held in place by headbands (Fig. 8). Owen suggests that the order in which Wynflaed's bequests are made might point to the *binde* being worn with other headcoverings, perhaps to secure or ornament them (Owen 1970, 215).

Other depictions of headdresses include the female figure of Pompa in a headdress with long streamers almost to the floor in Prudentius's *Psychomachia* (BL Add. MS 24199, 21v). A French painting of the Virgin Mary at the foot of the cross (Psalter-Hymnary of St-Germain-des-Prés, second half of the eleventh century, Bib. Nat. MS Lat 11550 f6) shows her wearing a swathed cap with a streamer (Fig. 9). In BL Stowe MS 944 f6 Queen Emma, wife of Cnut (AD 1020–30) is wearing a headband, apparently stiffened, under a draped veil with streamers perhaps coming from beneath the veil (Fig. 10).

Viking literary sources record that the headband was worn by both men and women. When Skarp-Hedin in Njal's Saga rides to the Althing, 'his hair was well combed back and held in place by a silk headband. He looked every inch a warrior' (Magnusson and Pálsson 1982, 248). Earlier in the same saga Gunnar was given by King Harold Gormsson in Hedeby 'his own robes, a pair of gold embroidered gloves, a headband studded with gold and a Russian fur cap' (Magnusson and Pálsson 1982, 91).

The *Rigspula* describes three types of household: a poor couple, substantial farmers and a noble family. In the second the woman of the house, the grandmother, wears a band round her head and her hair knotted in a bun. The shawl around her shoulders is fastened by a handsome clasp. In the noble family the mother wears a 'charming cap and on her breast were two oval brooches' (Crossley-Holland 1980, 20 and 22). The suggestion here may be that the caps were worn by women of a higher rank in society, whereas the headband is appropriate to the farming class. There may also have been different usage according to the age of the woman. These references are from sagas of the Icelandic oral tradition, written down only in the thirteenth century, with the attendant difficulties of precise dating.

Archaeological evidence in the tenth to twelfth/thirteenth centuries

The carved figures of queens in the Lewis chess set show them wearing short veils under their crowns that might well be made of silk. DHC17 (Pl. III, Fig. 27) could certainly be used in this way. The walrus-ivory chess pieces found on the Isle of Lewis, Scotland, are believed to have been made by a sculptor trained in a Norwegian milieu and date, in all probability, to the twelfth century. At that time Lewis was politically subject to the kingdom of Norway (Stratford 1997, 47) (Pl. V).

Thin gold bands with Scandinavian associations and dating to the twelfth and thirteenth centuries have been found in Ireland and Scotland (Pl. VI). A part of one band (E122:16545) was found in Viking Age levels in the excavations at Christ Church Place, Dublin (Ó Floinn 1983). The bands have a small round perforation at the end of each terminal and are suitably sized and shaped to be used as fillets or headbands securing scarves or veils in place.





Fig. 9. Detail from *Crucifixion*, *Psalter-Hymnary of St-Germain-des-Prés*, French, eleventh century AD.



Fig. 10. Detail, *Queen Emma presenting a cross to New Minster*, Winchester, BL Stowe MS 944, Anglo-Saxon, eleventh century AD.

However, the main archaeological evidence for the use of a headband or fillet in the tenth century comes from Birka in Sweden. In the male graves at Birka twenty examples are noted of which sixteen are described. Thirteen are complex since they are of a tiara and mitre type with hanging metal and gold wire ornaments. Three are tablet-woven 'bands for foreheads' (*Stirnbander*). Another (grave no. 886) has a silver plaited cord wound twice around the head. In about fifteen female graves tablet-woven bands with silver (twelve) and gold (three) metal thread were found (Geijer 1938, 157–75, Hägg 1982, 251). These may have secured other headcoverings since some pieces of silk had adhered to the bands. In grave no. 823 and grave no. 946 the women were also wearing oval brooches, so they were wearing traditional dress with the silver tablet-woven band as part of the headdress. In grave 946 the tablet-woven band was partially covered with silk cloth (Arbman 1943, 242, 373, 296 and 320).

Tablet-woven bands using silver and gold thread were also found in Dublin (Pritchard 1988, 150–6) and could perhaps have been used to secure other headcoverings as they were in Birka (Geijer 1938, 146). These ornamental bands may well have a long history either worn separately or with coifs or veils. Bands known as *vittae* were worn by Frankish and other women in Europe from the late Roman period. The remains of a gold-brocaded tablet-woven braid c. 340mm long, worn on the forehead and round the head, were found in a sixth-century Anglo-Saxon grave at Lyminge, Kent (grave no. 44) (Crowfoot and Hawkes 1967, 61–2, 50). *Vittae* are believed to have been worn also with other headcoverings. The Hiberno-Norse wool and silk bands are perhaps their more informal relations.

Hald, in her discussion of prehistoric and early historic costume in Denmark, refers to the *hlad*, a headband or frontlet, as having been generally worn in Scandinavia. These have continued to be part of folk dress, being worn by both men and women. Recent examples in the Nordiska Museet in Stockholm are 310–350mm long and 30–160mm wide (average 80mm). The bands are lengthened with narrow laces for tying (Hald 1980, 324–5). These dimensions are comparable to those of the Dublin bands.

Two fragments of headcoverings (S3, S35) were found in the settlement site at Haithabu. Both were woven in 2/2 twill in wool. S3 formed part of a hood with a short liripipe; S35 is described as part of a cap (Hägg 1991, 55–60). They seem unrelated to the Hiberno-Norse headcoverings.

Catalogue and diagrams of scarves and bands

DHC1.

SCARF Fishamble Street II E172:7672 (Pl. I; Fig. 11)
House FS 65, plot 1, level 9; late tenth/early eleventh century.

Fibre: Wool.
Weave: Tabby, open, regular.
Colour: Dark reddish brown 5YR 2.5/2.
Condition: Poor, better close to selvedge.
Dimensions: 480mm (minimum including fringe) × 180mm.
Warp *Weft*
Spin direction: Z Z
Degree of spin: Loose Loose
Yarn diameter: 0.16–0.21mm 0.19–0.21mm
Threads per cm: 15–22 11–14
Selvedges: Two.
Selvedge loops: 2–4mm long.
Fringes: One, 35mm long.
Dye: Analysis undertaken; ellagic acid present.
Sewing: No.

DHC2.

SCARF Fishamble Street II E172:11051 (Fig. 12)
Layer H105, plot 1, level pre-1; early tenth century.

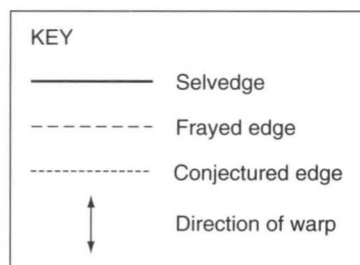
Fibre: Wool.
Weave: Tabby, open, regular, some kinking in spin of yarn.
Colour: Dark brown 7.5YR 3/2.
Condition: Poor.
Dimensions: Actual: A) 160mm × 217mm, B) 190mm × 55mm, C) 90mm × 40mm, D) 120mm × 100mm, E) 90mm × 50mm, F) 120mm × 50mm. Estimated original (minimum): 520mm × 217mm including fringe.

Warp *Weft*
Spin direction: Z Z
Degree of spin: Loose Loose
Yarn diameter: 0.09–0.15mm 0.13–0.14mm
Threads per cm: 24–26 15–18
Selvedges: One.
Selvedge loops: 3mm long.
Fringes: One, 55–65mm long.
Dye: No analysis.
Sewing: No.

DHC3.

SCARF FRAGMENT Fishamble Street II E172:12587 (Fig. 13)
Organic layer L814 in house FS 74, plot 6, level 9; late tenth/early eleventh century.

Fibre: Wool.
Weave: Tabby, open, regular.
Colour: Dark reddish brown 5YR 2.5/2.
Condition: Poor.



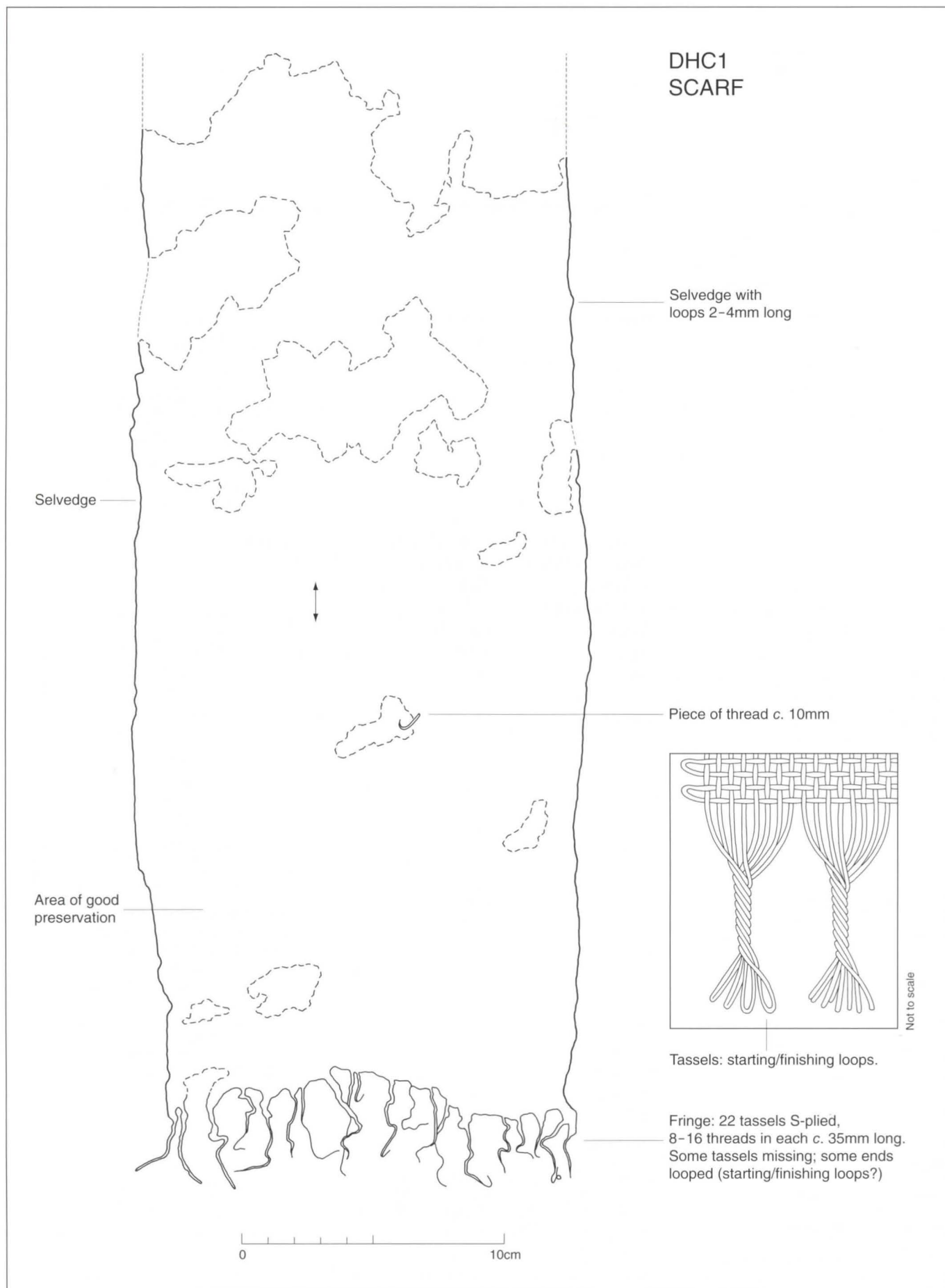


Fig. 11. DHC1 (E172:7672).

DHC2 SCARF

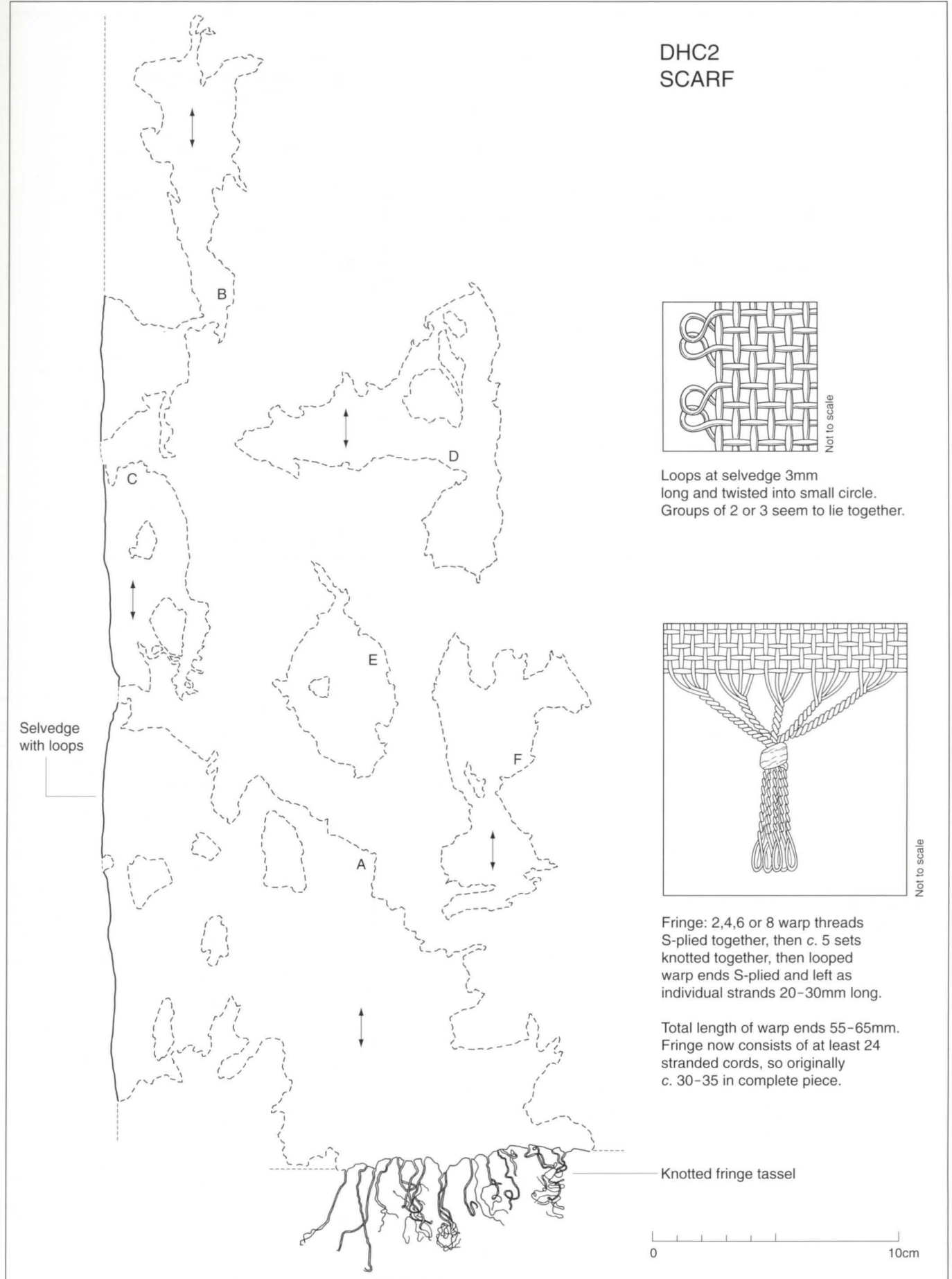


Fig. 12. DHC2 (E172:11051).

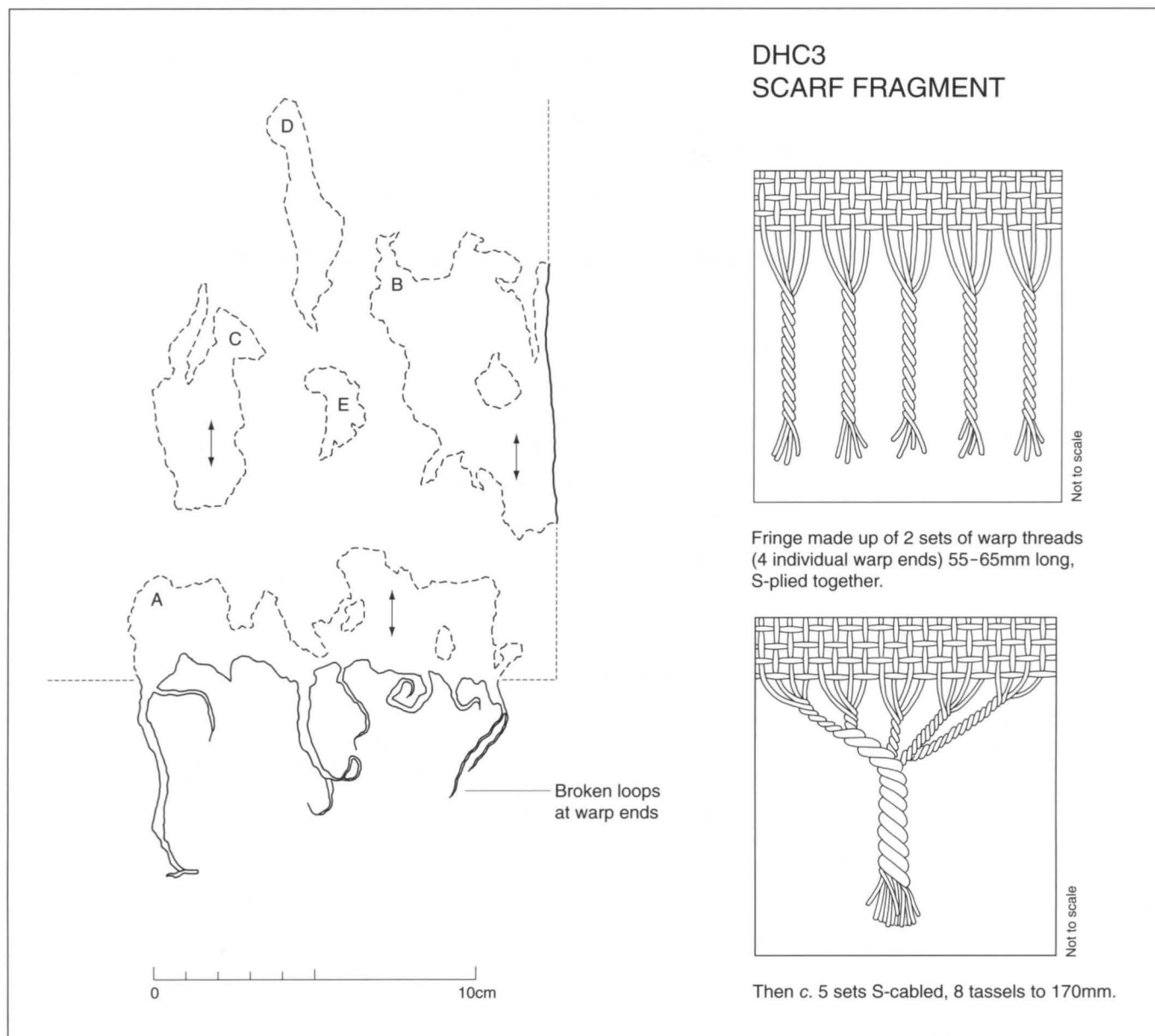


Fig. 13. DHC3 (E172:12587).

Dimensions:

Actual: A) 100mm × 110mm, B) 80mm × 60mm, C) 65mm × 30mm, D) 70mm × 20mm, E) 50mm × 20mm. Estimated original: (minimum) 130mm × 170mm (including fringes of 55-65mm).

Spin direction:

Warp

Weft

Z

Z

Degree of spin:

Loose

Loose

Yarn diameter:

0.20-0.23mm

0.19-0.21mm

Threads per cm:

13-18

9-11

Selvages:

One.

Selvage loops:

1-2mm long.

Fringes:

One, 55-65mm long.

Dye:

No analysis.

Sewing:

No.

DHC4.

SCARF FRAGMENT Fishamble Street II E172:13535 (Fig. 14)
Sod layer L1171 in structure F1153, plot 4, level 5; mid-/late
tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 3/2.	
Condition:	Very poor.	
Dimensions:	200mm (minimum) × 150mm including fringe.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Tight
Yarn diameter:	0.17–0.20mm	0.18–0.20mm
Threads per cm:	19–25	11–12
Selvages:	Two.	
Selvedge loops:	2mm long.	
Fringes:	One, 20mm long.	
Dye:	No analysis.	
Sewing:	No.	
Comments:	Thread count unreliable owing to cloth distortion. Hairs caught in cloth; unidentifiable as human.	

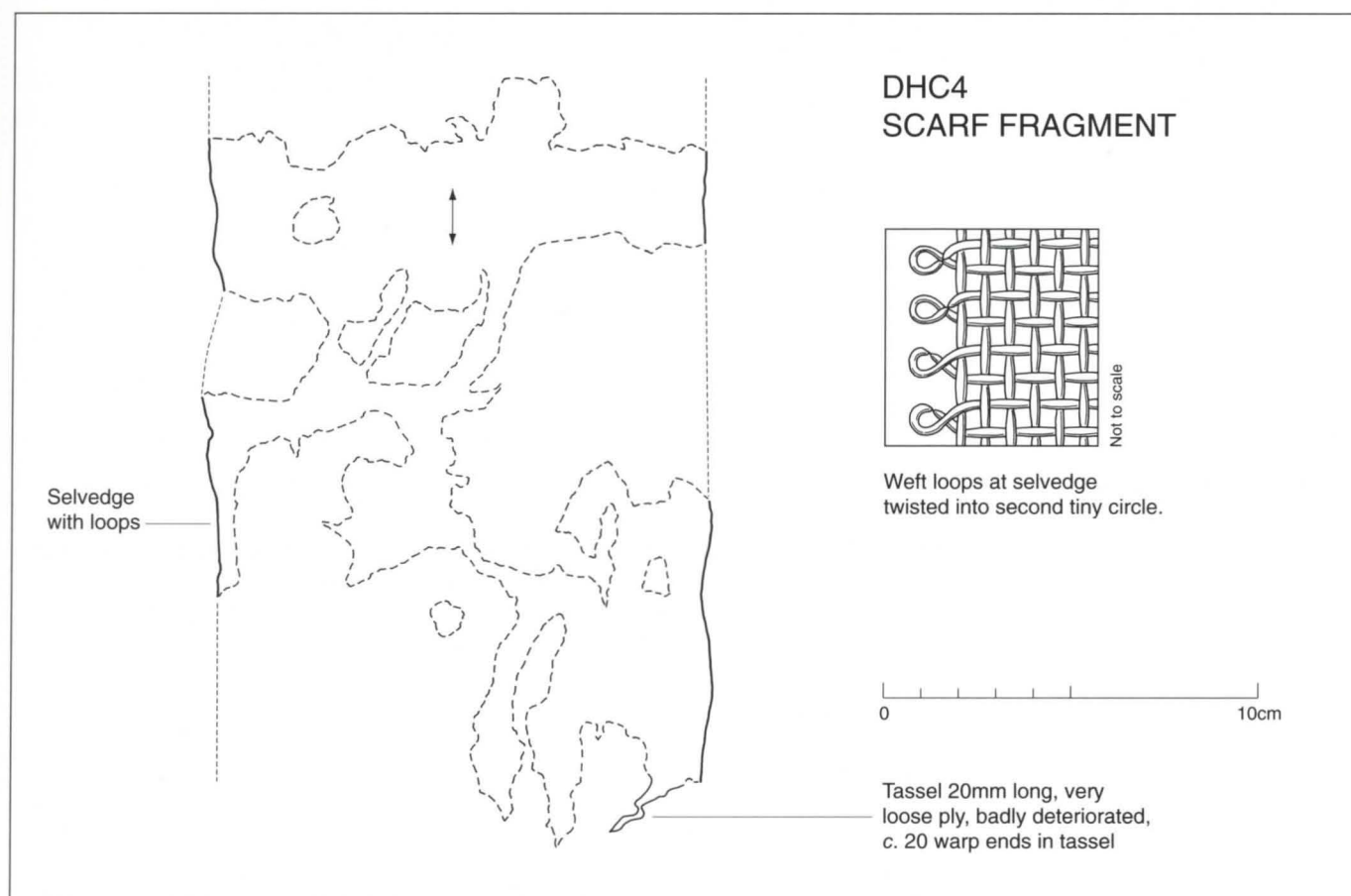


Fig. 14. *DHC4* (E172:13535).

DHC5.

SCARF FRAGMENT Fishamble Street II E172:13697 (Fig. 15)
Open area F1200, west of houses FS 14 and FS 15, plot 3, level
4; mid-tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Very dusky red 2.5YR 2.5/2.	
Condition:	Poor, brittle.	
Dimensions:	250mm (minimum) × 210mm including fringe.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.17–0.19mm	0.20–0.21mm
Threads per cm:	13–18	11–14
Selvages:	Two.	
Selvage loops:	3mm long.	

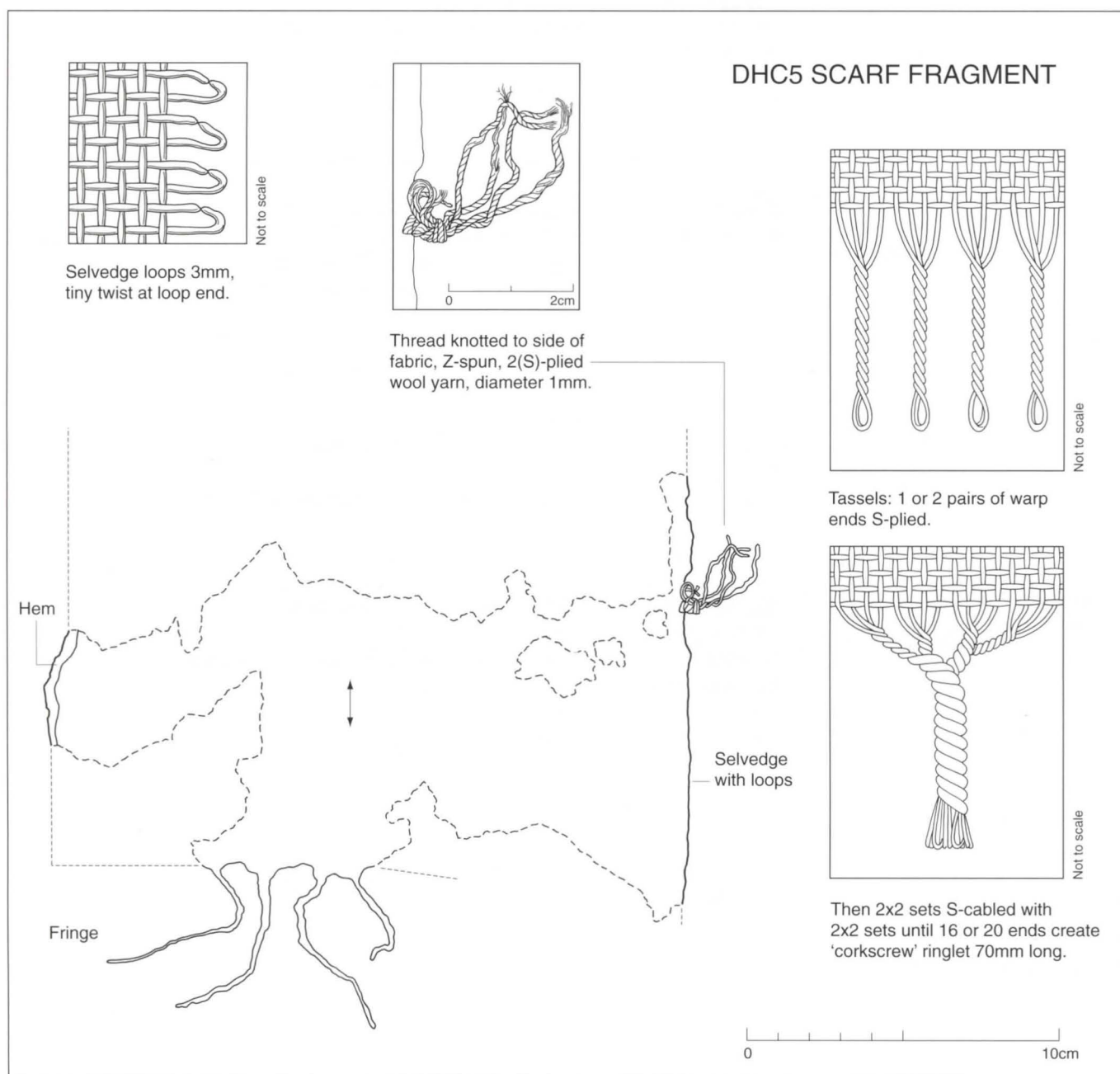


Fig. 15. DHC5 (E172:13697).

Fringes:	One, 70mm.
Dye:	Analysis undertaken; traces of iron mordant detected.
Sewing:	Yes.

DHC6.

SCARF FRAGMENT Fishamble Street II E172:13714 (Fig. 16)
 Levelling layer F1247, under house FS 14, plot 3, level 4; mid-tenth century.

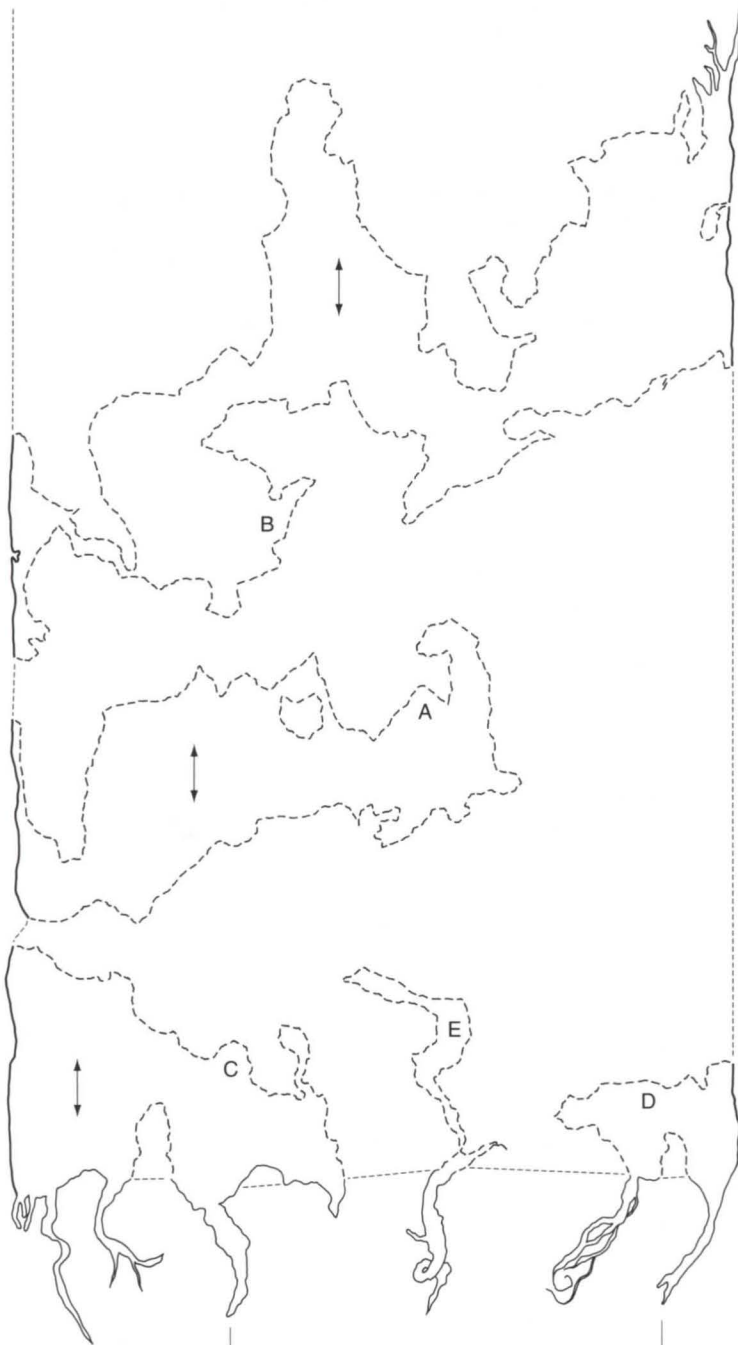
Fibre:	Wool.
Weave:	Tabby, open, regular.
Colour:	Very dusky red, 2.5YR 2.5/2.
Condition:	Very poor, cloth distorted.
Dimensions:	Actual: A) 80mm × 190mm, B) 200mm × 240mm, C) 80mm × 130mm, D) 100mm × 100mm, E) 90mm × 20mm. Estimated original: (minimum) 450mm × 240mm including fringes.
	<i>Warp</i> <i>Weft</i>
Spin direction:	Z Z
Degree of spin:	Medium/Loose Medium/Loose
Yarn diameter:	0.19–0.20mm 0.15–0.18mm
Threads per cm:	15–22 9–10
Selvages:	Two.
Selvedge loops:	2mm long.
Fringes:	Two, end one c. 60mm, end two c. 30mm.
Dye:	No analysis.
Sewing:	No, but loose thread found lying in with cloth.
Comments:	Badly deteriorated textile, both ends present but possible centre length missing. Pieces left seem to be the two ends folded together with middle part missing.

DHC7.

SCARF Fishamble Street II E172:14623 (Fig. 17)
 Context uncertain; date uncertain.

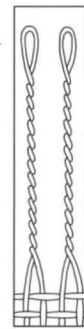
Fibre:	Wool.
Weave:	Tabby, open, regular.
Colour:	Dark reddish brown 5YR 2.5/2.
Condition:	Medium.
Dimensions:	Actual: 330mm × 230mm including fringe.
	<i>Warp</i> <i>Weft</i>
Spin direction:	Z Z
Degree of spin:	Loose Medium/Tight
Yarn diameter:	0.24–0.26mm 0.22–0.27mm
Threads per cm:	14–16 9–10
Selvages:	Two? Edges frayed but some looped ends visible.
Selvedge loops:	Not possible to judge.
Fringes:	One, 50mm.
Dye:	No analysis.
Sewing:	No.

DHC6 SCARF FRAGMENT

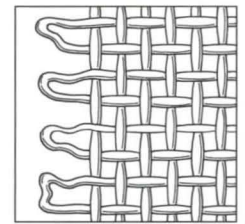


'Corkscrew' type tassel

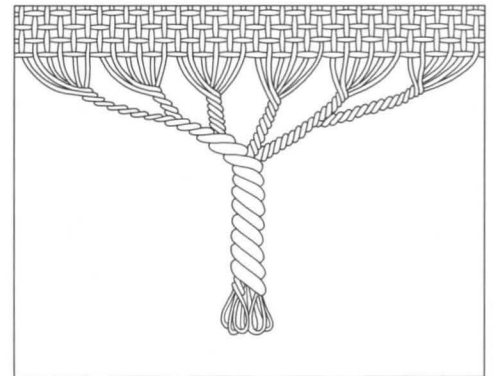
Tassel S-plied and plaited



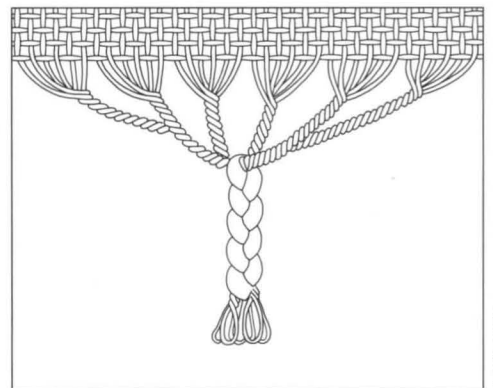
S-plied warp loops visible.



Selvedge loop structure.



Tassels: 6-12 threads S-plied together, then 6 sets S-cabled to form 'corkscrew' type.



Also 6 sets plaited.

Fig. 16. DHC6 (E172:13714).

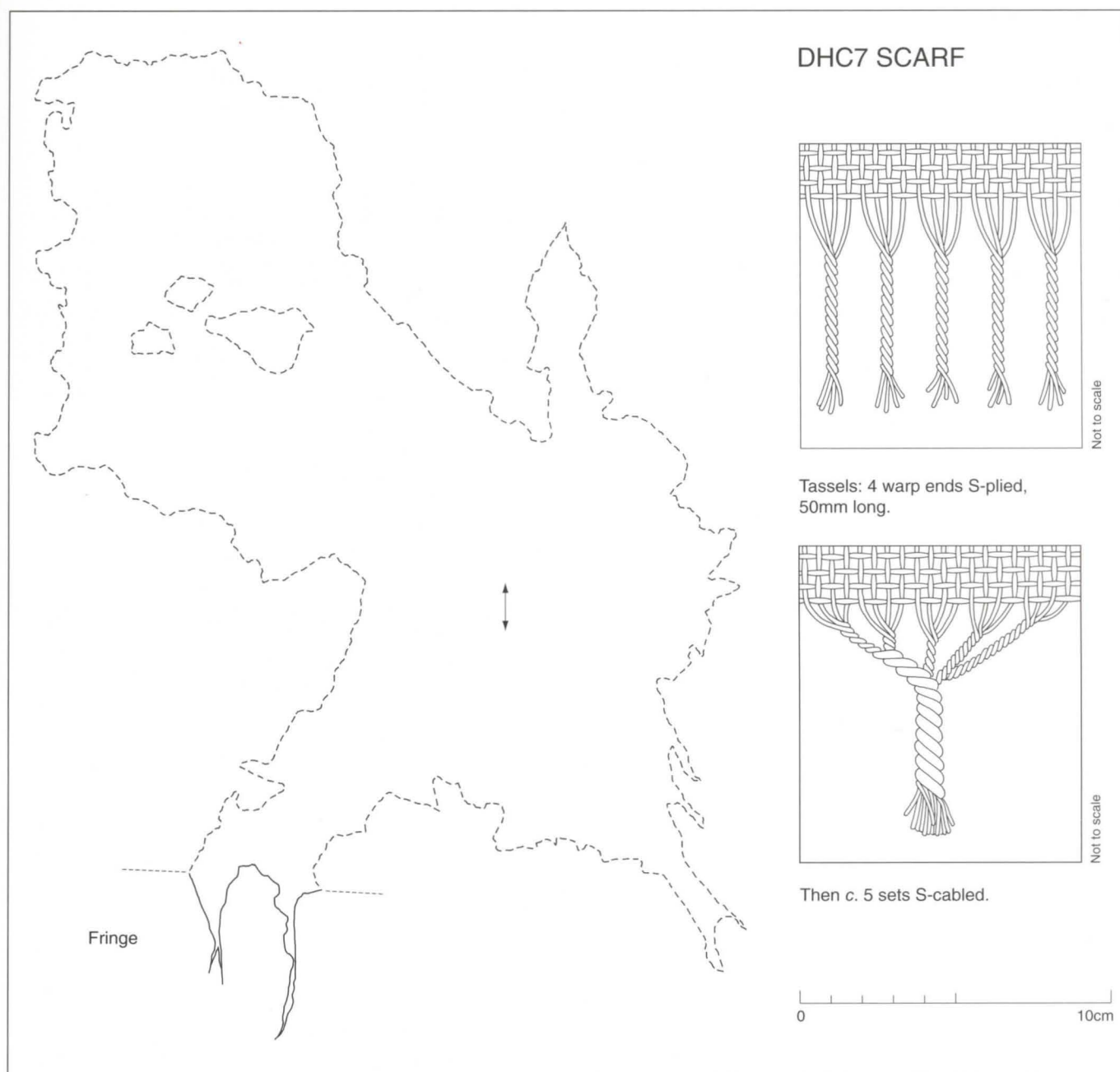


Fig. 17. DHC7 (E172:14623).

DHC8.

Fibre:

Weave:

Colour:

Condition:

Dimensions:

Twist direction:

Degree of twist:

Yarn diameter:

Threads per cm:

Selvages:

Selvage loops:

SCARF Fishamble Street II E172:12397 (Fig. 18)

Organic layer L488, open area west of house FS 51, plot 3, level 8; late tenth century.

Silk.

Tabby, open, springy textured cloth with crêpe effect.

Reddish brown 5YR 4/3.

Very poor, weave badly distorted; difficulty in taking accurate counts.

A) 610mm × 220mm including fringes, B) 230mm × 100mm.

Warp

Weft

Z

Z

Very loose

Very loose, a little tightly twisted thread

0.09–0.10mm

0.08–0.09mm

22–25

16–18

Two.

4mm long.

DHC8 SCARF

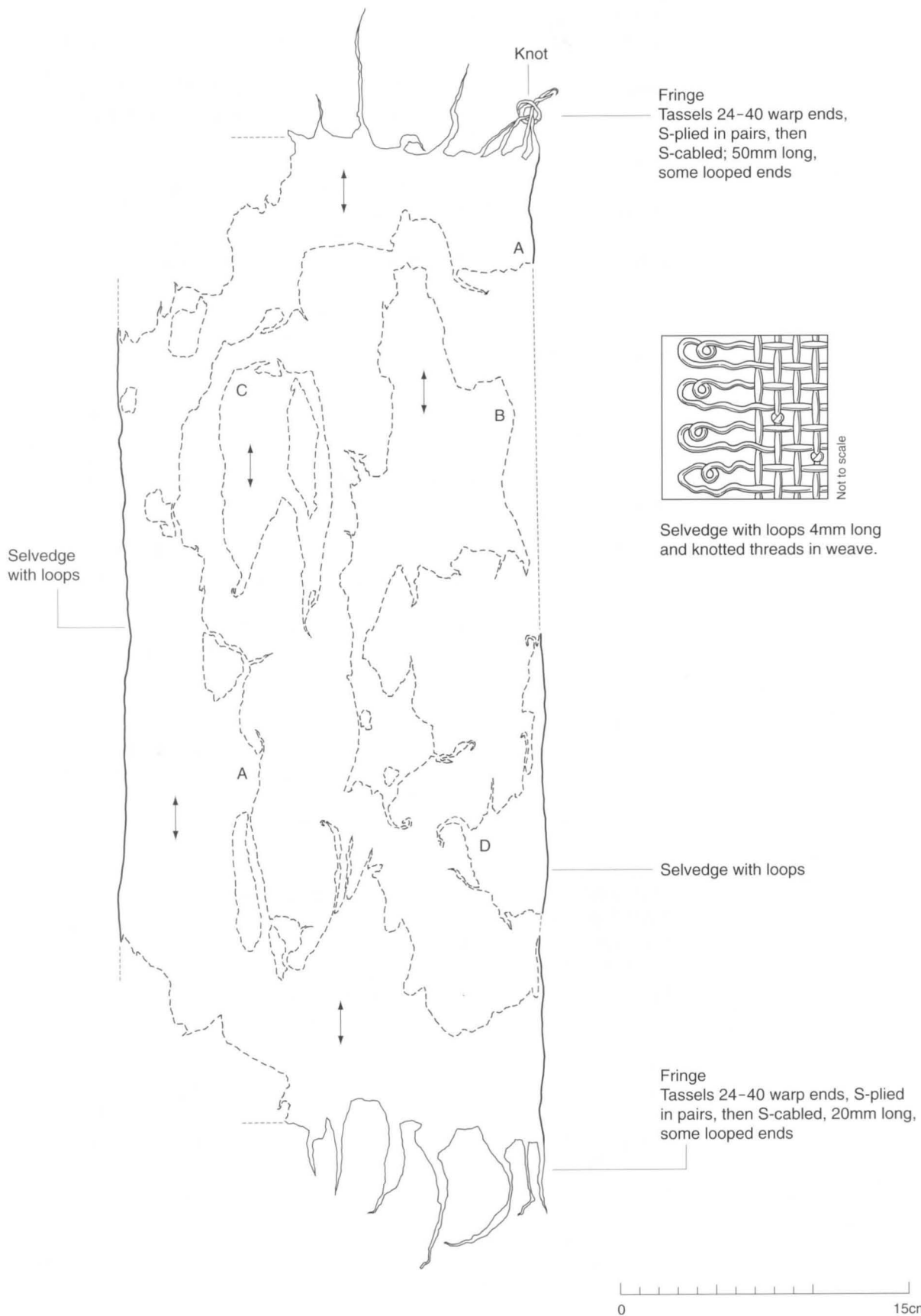


Fig. 18. DHC8 (E172:12397).

Fringes:	Two, 20mm and 50mm long.
Dye:	Analysis undertaken; madder detected (alizarin).
Sewing:	No.
Comments:	The cloth, although fragmented, can be completely reconstructed.

DHC9.

SCARF Fishamble Street II E172:12551 (Fig. 19)
Organic floor layer L1050 in house FS 39, plot 3, level 7; late tenth century.

Fibre:	Silk.
Weave:	Tabby, kinking in the twist of some threads.
Colour:	Reddish brown 5YR 4/3.
Condition:	Very poor, so threads per cm counted from best preserved part.
Dimensions:	380mm (minimum) × 175mm including fringe.
	<i>Warp</i> <i>Weft</i>
Twist direction:	Z Z
Degree of twist:	Loose Loose
Yarn diameter:	0.10–0.11mm 0.08–0.09mm
Threads per cm:	19–25 16–18
Selvedges:	Two.
Selvedge loops:	4mm long when extended.
Fringes:	One, c. 20mm.
Dye:	Analysis undertaken; no dye detected.
Sewing:	No.

DHC10.

SCARF Fishamble Street II E172:13396 (Fig. 20)
Organic layer L913, plot 6, level 4; mid-tenth century.

Fibre:	Silk.
Weave:	Tabby, open, regular, some kinking or twisting of threads. One or two knots in threads in weave in lower left corner. One warp end is kinked so tightly that it looks like a tight curl, and is knotted immediately beyond the kinking.
Colour:	Dark reddish brown 2.5YR 3/4.
Condition:	Medium, weave distorted, small area in good condition.
Dimensions:	595mm × 210–230mm with fringes (wider dimension at end with shorter fringe).
	<i>Warp</i> <i>Weft</i>
Twist direction:	Z Z
Degree of twist:	Loose Medium
Yarn diameter:	0.12–0.17mm 0.16–0.19mm
Threads per cm:	16–21 12–15
Selvedges:	Two.
Selvedge loops:	2mm long.
Fringes:	Two, c. 30mm and c. 60mm long.
Dye:	Analysis undertaken; no dye detected.
Sewing:	No.
Comments:	This piece is complete.

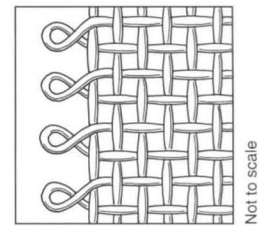
DHC9 SCARF



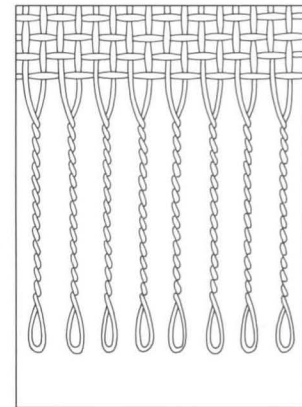
Fig. 19. DHC9 (E172:12551).

DHC10 SCARF

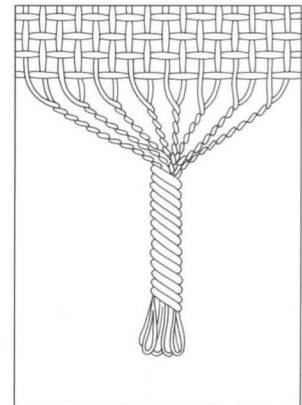
Upper fringe is made of paired warp ends, S-plied and then S-cabled in sets of 11-24 pairs to form tassels c. 60mm long, some looped ends



Selvedge loops at both selvedges.



Tassels: paired warp ends S-plied.



Then sets of pairs S-cabled.

Lower fringe is made of paired warp threads (looped ends still visible) S-plied and then S-cabled again in sets of 5-12 pairs c. 30mm long



Fig. 20. DHC10 (E172:13396).

DHC11.	<i>SCARF</i> Fishamble Street II E172:14407 (Fig. 21) Organic layer L998, plot 6, level 1; early tenth century.	
Fibre:	Silk.	
Weave:	Tabby, open, regular. Warp and weft threads kinked in spinning.	
Colour:	Very dusky red 2.5YR 2.5/2. Under the microscope warp ends dark brown, weft picks golden.	
Condition:	Medium, complete in external dimensions, central section destroyed. Distortion in some places.	
Dimensions:	700mm × 210mm including fringes.	
	<i>Warp</i>	<i>Weft</i>
Twist direction:	Z	Z
Degree of twist:	Medium/Tight	Loose/Medium
Yarn diameter:	0.13–0.18mm	0.15–0.17mm
Threads per cm:	19–21	13–16
Selvedges:	Two, c. 3–4mm band of more densely woven cloth at selvedges, where warp threads are 28 ends to 4mm.	
Selvedge loops:	2–4mm long, kinked.	
Fringes:	Two, end one c. 60mm; end two c. 100mm, knotted at 80mm, 2 pairs of 16–20 warp threads Z-plied and then S-plied again.	
Dye:	Analysis undertaken; no dye detected.	
Sewing:	No.	
DHC12.	<i>SCARF</i> Fishamble Street II E172:15348 (Pl. II; Fig. 22) Organic fill F1377 in house FS 6, plot 3, level 2; early/mid-tenth century.	
Fibre:	Silk.	
Weave:	Tabby, open.	
Colour:	Dark yellowish brown 10YR 4/6.	
Condition:	Medium, weave distorted.	
Dimensions:	Actual: A) 260mm × 240mm, B) 315mm × 240mm, C) 180mm × 240mm, D) 130mm × 40mm, E) 170mm × 60mm. Estimated original: 670mm (minimum) × 240mm including fringes. Piece so badly distorted that width given may be too great—originally 210mm?	
	<i>Warp</i>	<i>Weft</i>
Twist direction:	Z	Z
Degree of twist:	Loose	Very loose
Yarn diameter:	0.14–0.17mm	0.20–0.26mm
Threads per cm:	17–19	11–16
Selvedges:	Two.	
Selvedge loops:	c. 2–3mm.	
Fringes:	Two, end one 40–50mm long, end two 70–80mm long.	
Dye:	Analysis undertaken; possible traces of indigotin.	
Sewing:	No.	
DHC13.	<i>SCARF</i> Fishamble Street III E190:3541 (Fig. 23) Grey mud/ash mix L902, plot 8, level uncertain; date uncertain.	
Fibre:	Silk.	
Weave:	Tabby, open, regular. Many little kinks and twists in threads. In several places threads knotted together.	
Colour:	Reddish brown 5YR 4/3.	
Condition:	Good.	
Dimensions:	Actual: A) 270mm × 150mm, B) 110mm × 150mm. Estimated original: 380mm (minimum) × 150mm.	
	<i>Warp</i>	<i>Weft</i>
Twist direction:	Z	Z
Degree of twist:	Loose	Loose
Yarn diameter:	0.12–0.14mm	0.09–0.14mm

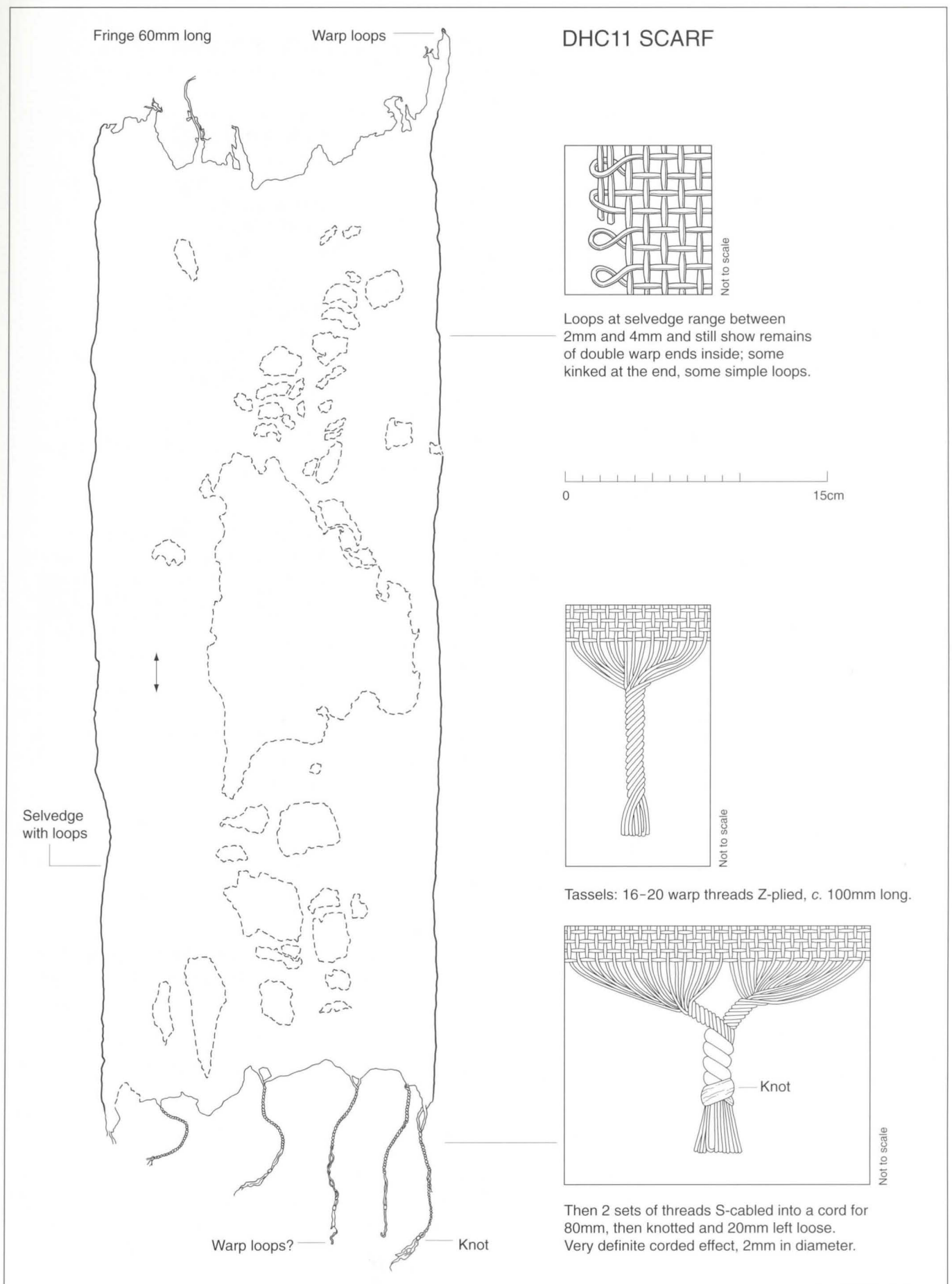


Fig. 21. DHC11 (E172:14407).

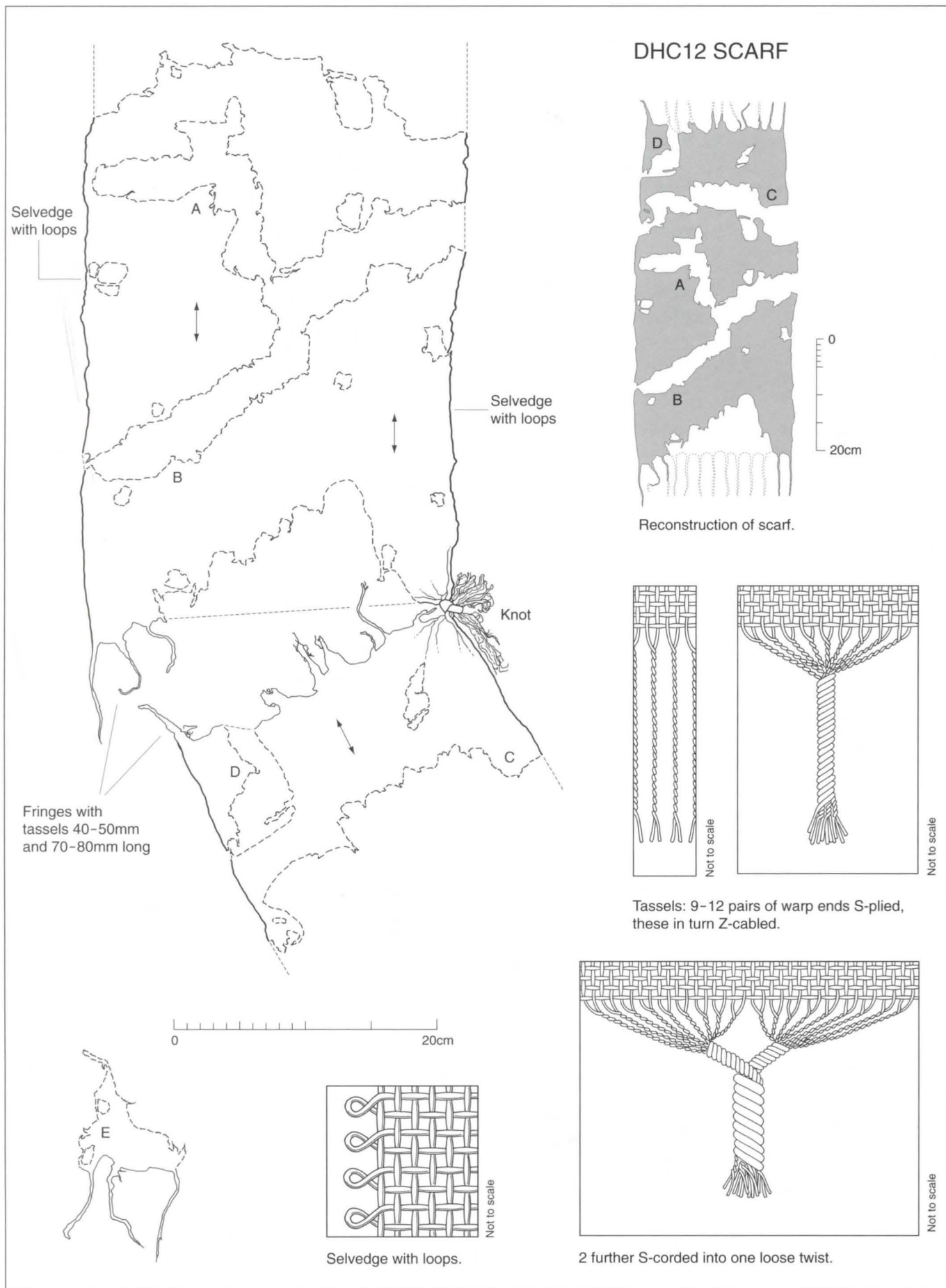


Fig. 22. DHC12 (E172:15348).

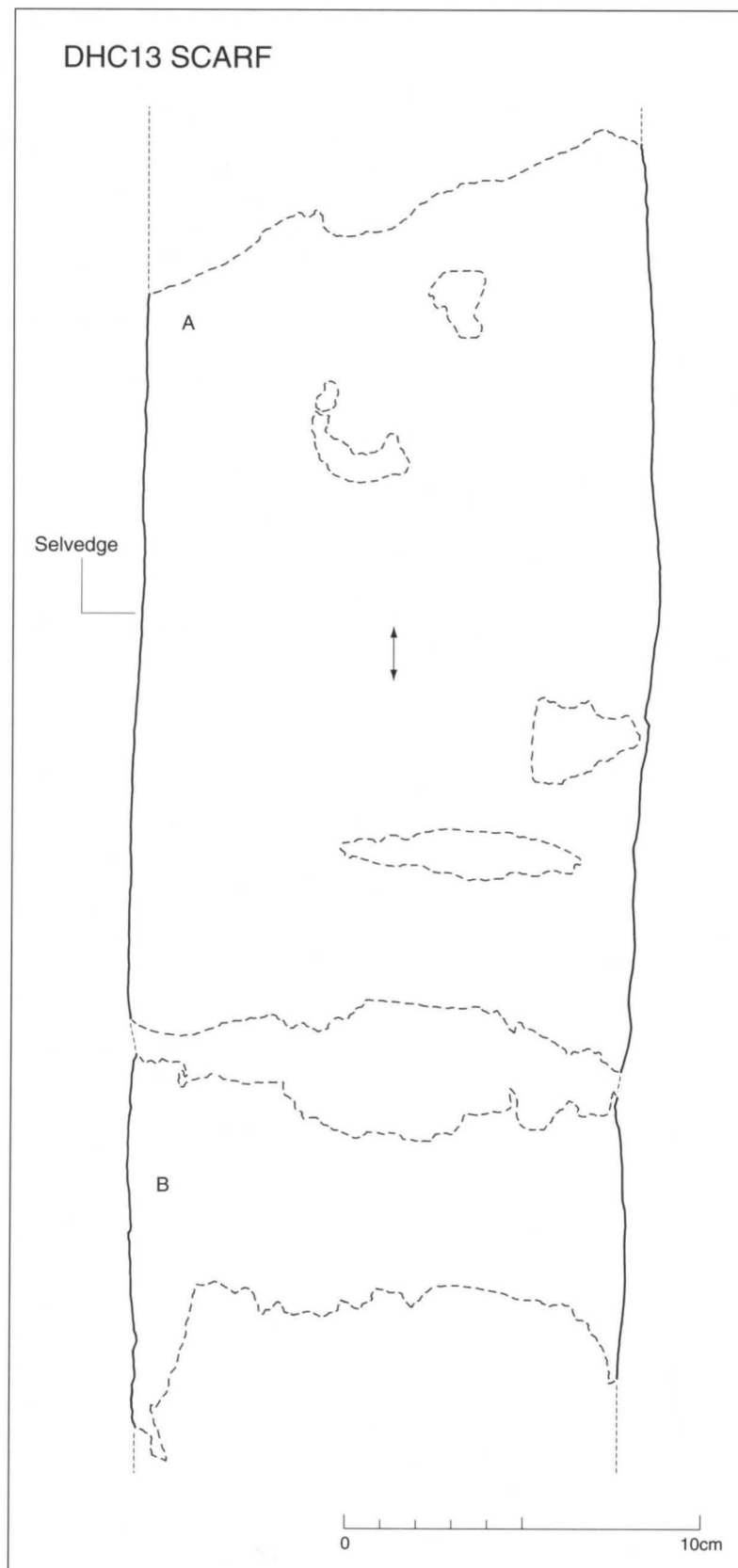


Fig. 23. DHC13 (E190:3541).

Threads per cm:	30–41	19–32
Selvages:	Two.	
Selvedge loops:	1mm.	
Fringes:	No.	
Dye:	Analysis undertaken; no dye detected.	
Sewing:	No.	

DHC14.

SCARF FRAGMENTS? Fishamble Street II E172:10580 (Fig. 24)
Sod layer F109, east end of plot 2, level 6; mid-/late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Medium.	
Dimensions:	A) 105mm × 105mm including fringe, B) 35mm × 30mm, C) 35mm × 10mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.15–0.18mm	0.14–0.19mm
Threads per cm:	14–16	11–15
Selvages:	No.	
Selvedge loops:	No.	
Fringes:	One, 30mm long.	
Dye:	No analysis.	
Sewing:	No.	

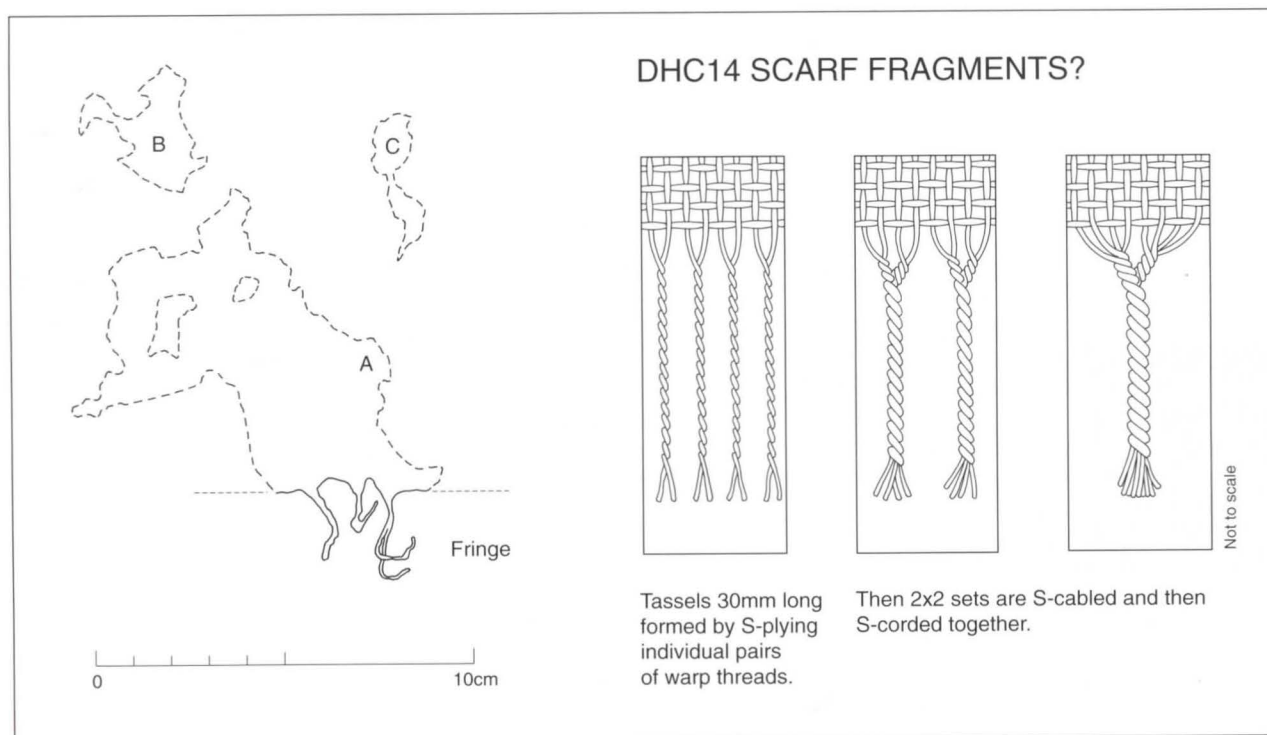


Fig. 24. DHC14 (E172:10580).

DHC15.

SCARF FRAGMENT? Fishamble Street II E172:13780 (Fig. 25)
Open area F1200, west of houses FS 14 and FS 15, plot 3, level 4; mid-tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular. Weft threads kinked in spinning.	
Colour:	Very dusky red 2.5YR 2.5/2.	
Condition:	Medium.	
Dimensions:	250mm × 240mm including possible fringe.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.16–0.21mm	0.15–0.19mm
Threads per cm:	11–13	11–12
Selvages:	One. At selvedge one pair of weft threads extends c. 20mm out from edge. Selvedge loops kinked and twisted.	
Selvedge loops:	4mm long.	
Fringes:	One? badly deteriorated.	
Dye:	No analysis.	
Sewing:	No.	

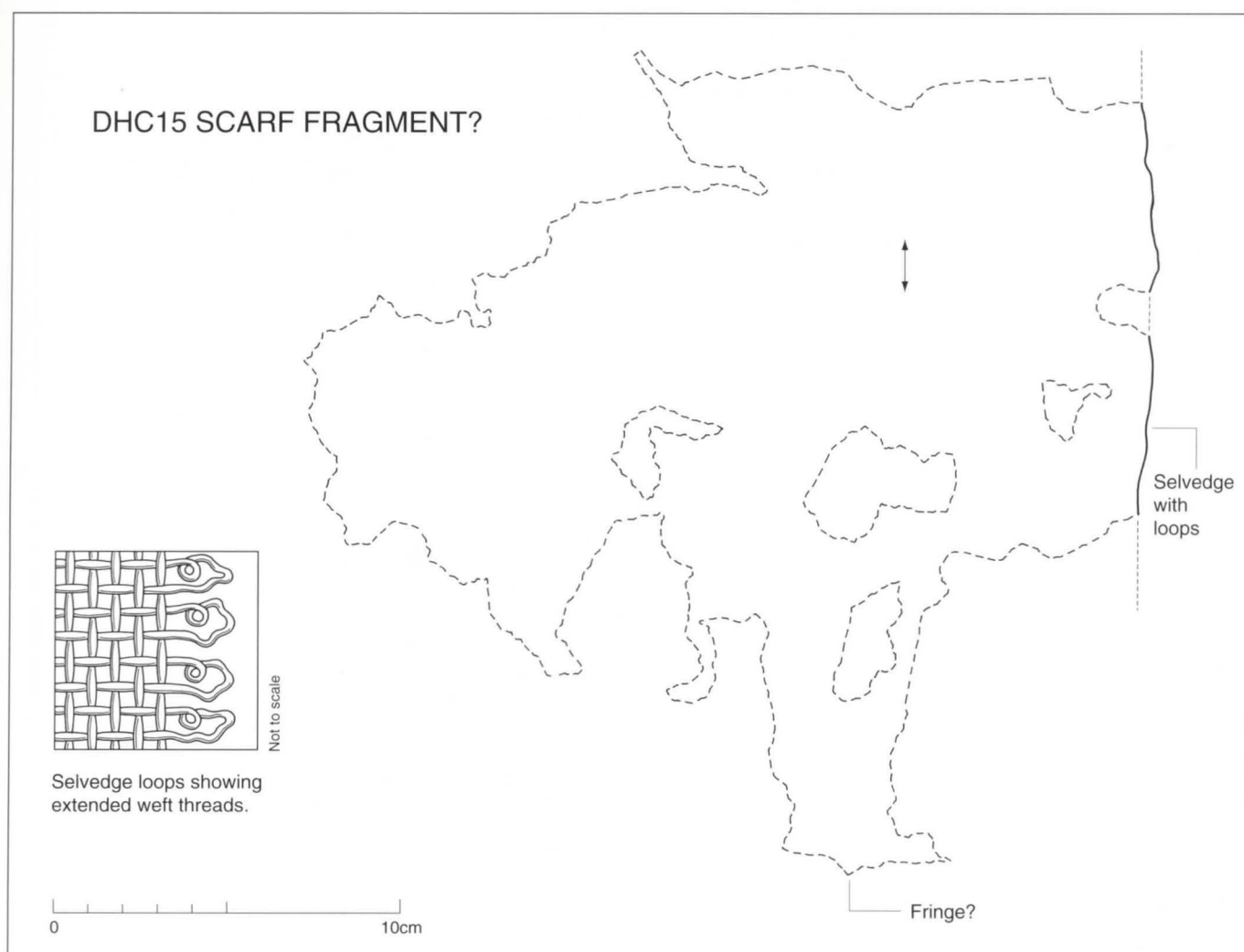


Fig. 25. DHC15 (E172:13780).

DHC16.

SCARF FRAGMENT? Fishamble Street III E190:7524
(Fig. 26)

Organic layer L1070, structure F1056, west of house FS 47, plot 9, level 7; mid-/late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 3/2.	
Condition:	Good but stained.	
Dimensions:	Actual: A) 220mm × 170mm, B) 70mm × 30mm. Estimated original: (minimum) 220mm × 170mm.	
	<i>System 1</i>	<i>System 2</i>
Spin direction:	Z	Z
Degree of spin:	Medium/Loose	Medium/Loose
Yarn diameter:	0.18–0.26mm	0.20–0.25mm
Threads per cm:	18–20	16–20
Selvedges:	One?	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	Analysis undertaken; traces of iron mordant present.	
Sewing:	One stitch visible.	
Comments:	Human hairs caught in cloth.	

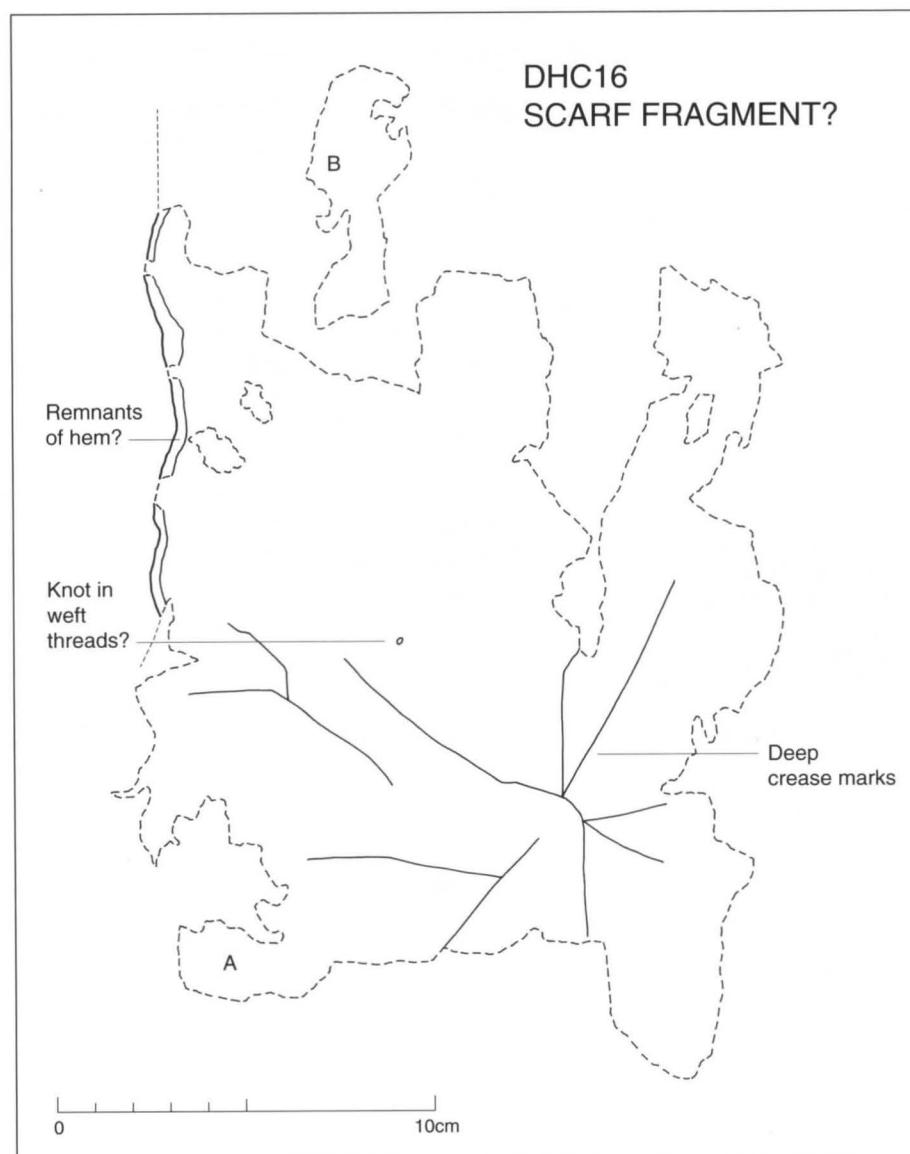


Fig. 26. DHC16 (E190:7524).

DHC17.

VEIL-TYPE CLOTH Fishamble Street II E172:9115 (Pl. III, Fig. 27)

Sandy mud L214 in house FS 83; early eleventh century.

Fibre:

Silk.

Weave:

Tabby, open.

Colour:

Reddish brown 2.5YR 4/4, retains remains of red colour.

Condition:

Poor, small areas of good preservation. Part of weave gives appearance of banding and gathering but this seems to be the result of weathering in the ground.

Dimensions:

Actual: A) 840mm × 240mm, B) 510mm × 60mm, C) 90mm × 60mm, D) 80mm × 50mm, E) 140mm × 30mm. Estimated original: 870mm (minimum) × 240mm.

Twist direction:

Warp *Weft*

Z

Z

Degree of twist:

Very loose

Very loose

Yarn diameter:

0.28–0.35mm

0.19–0.31mm

Threads per cm:

15–23

10–12

Selvedges:

Two, paired warps running through outermost wefts, then 8 fine ends set close together.

Selvedge loops:

No.

Fringes:

No.

Dye:

Analysis undertaken; lichen purple detected.

Sewing:

Hems at top and bottom doubled and 4mm deep. No stitches remaining.

DHC18.

BAND Fishamble Street II E172:5865 (Fig. 28)

Organic layer L65 in structure Q, plot 4, level 13; mid-eleventh century.

Fibre:

Wool.

Weave:

Tabby, open, regular.

Colour:

Black 5YR 2.5/1.

Condition:

Medium/good.

Dimensions:

385mm × 160mm.

Spin direction:

Warp *Weft*

Z

Z

Degree of spin:

Loose

Loose

Yarn diameter:

0.23–0.29mm

0.26–0.29mm

Threads per cm:

12–17

11–13

Selvedges:

Two.

Selvedge loops:

No.

Fringes:

Two, but lying under hemmed ends and so cannot be analysed.

Dye:

No analysis.

Sewing:

Yes.

Comments:

Textile complete with both selvedges and both hems. Selvedges plain without reinforcing.

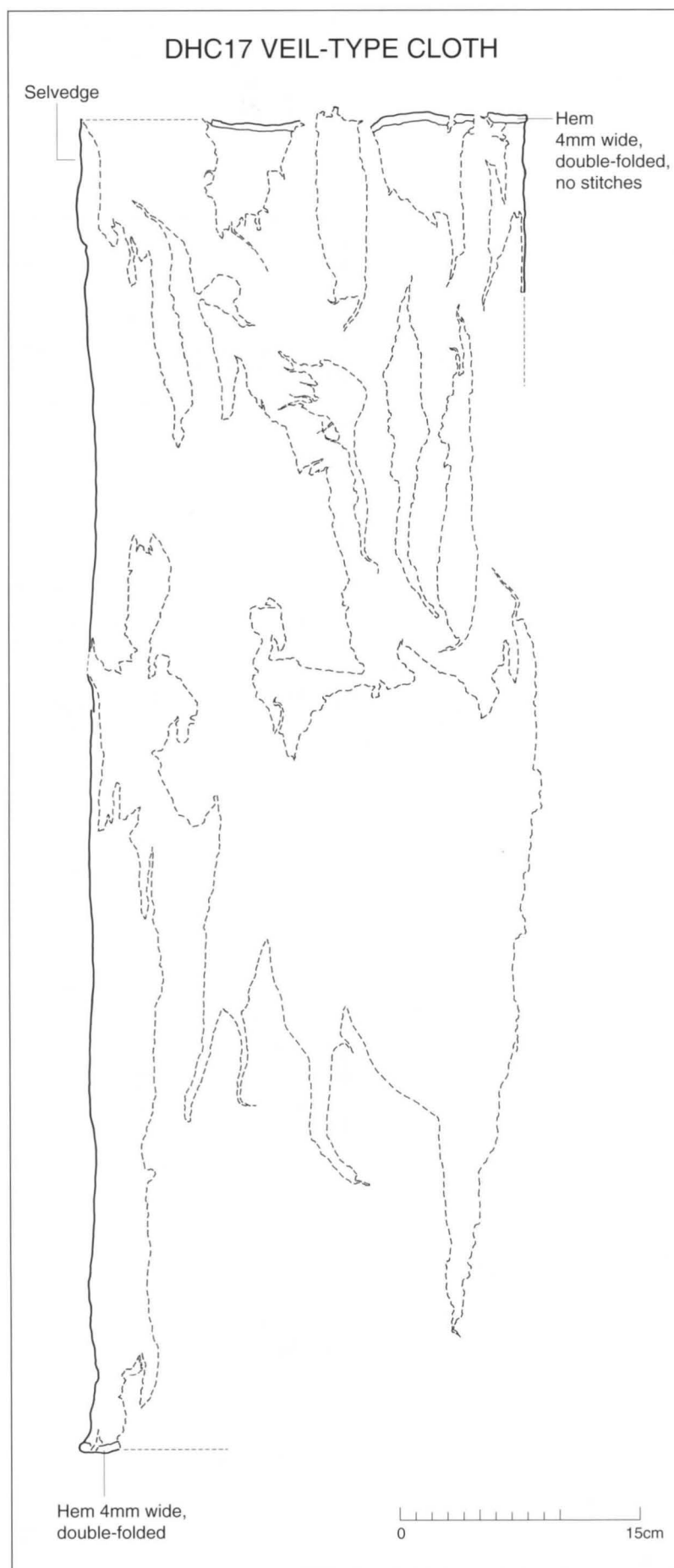


Fig. 27. DHC17 (E172:9115).

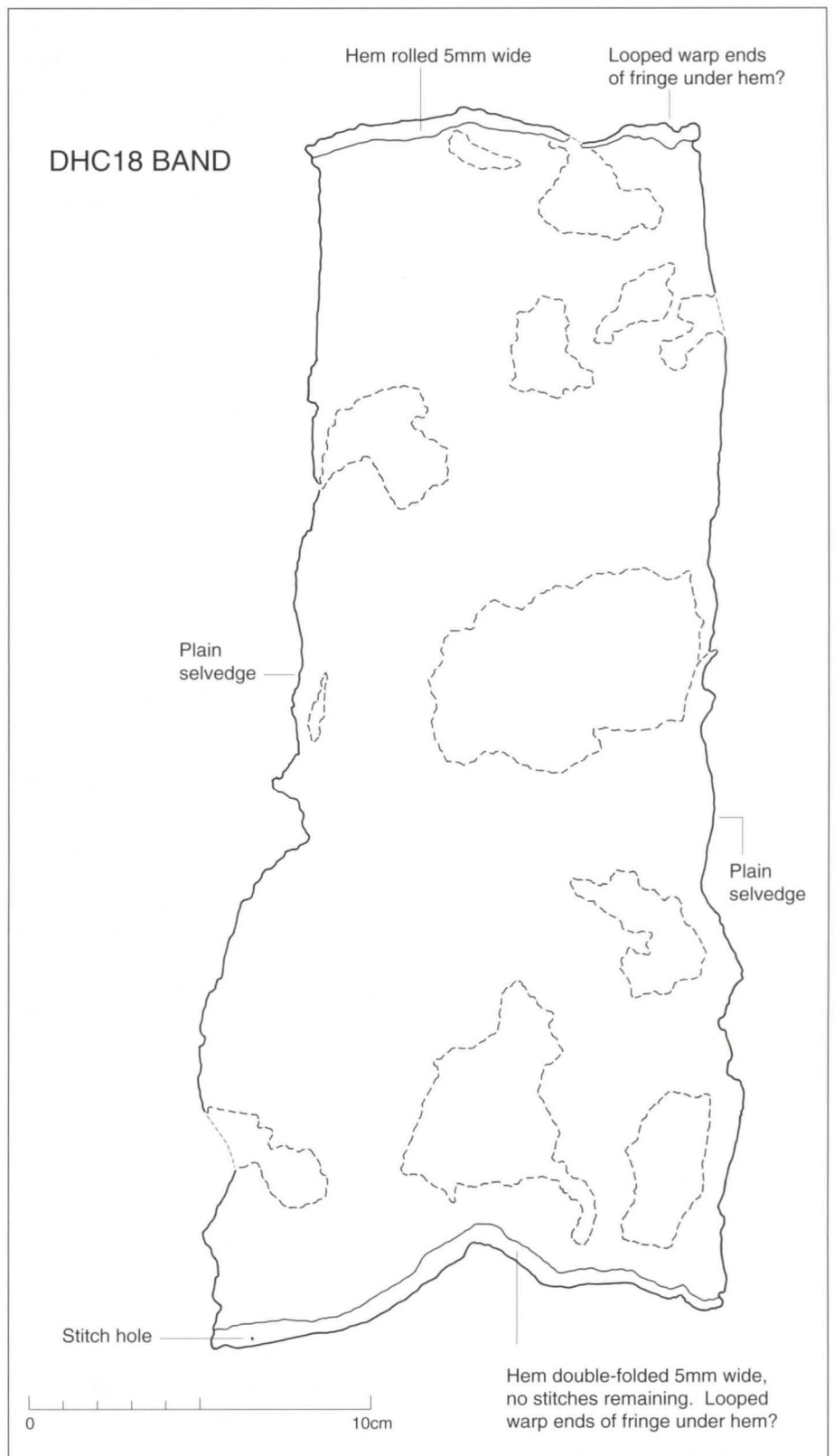


Fig. 28. *DHC18 (E172:5865)*.

DHC19.

Fibre:
Weave:
Colour:
Condition:
Dimensions:

BAND Fishamble Street III E190:3275 (Fig. 29)
Organic layer L353, plot 8, level 11; early/mid-eleventh century.
Wool.

Tabby, open, regular.
Black N2/0.

Very poor.

Actual: A) 190mm × 90mm, B) 30mm × 80mm, C) 45mm × 25mm, D) 70mm × 40mm, E) 110mm × 60mm. Estimated original: (minimum) 300mm × 90–100mm including fringe.

Spin direction:
Degree of spin:
Yarn diameter:
Threads per cm:
Selvedges:

<i>Warp</i>	<i>Weft</i>
Z	Z
Medium/Loose	Medium/Loose
0.16–0.18mm	0.18–0.21mm
14–19	11–13
Two? Second selvedge indicated by single looped weft pick.	

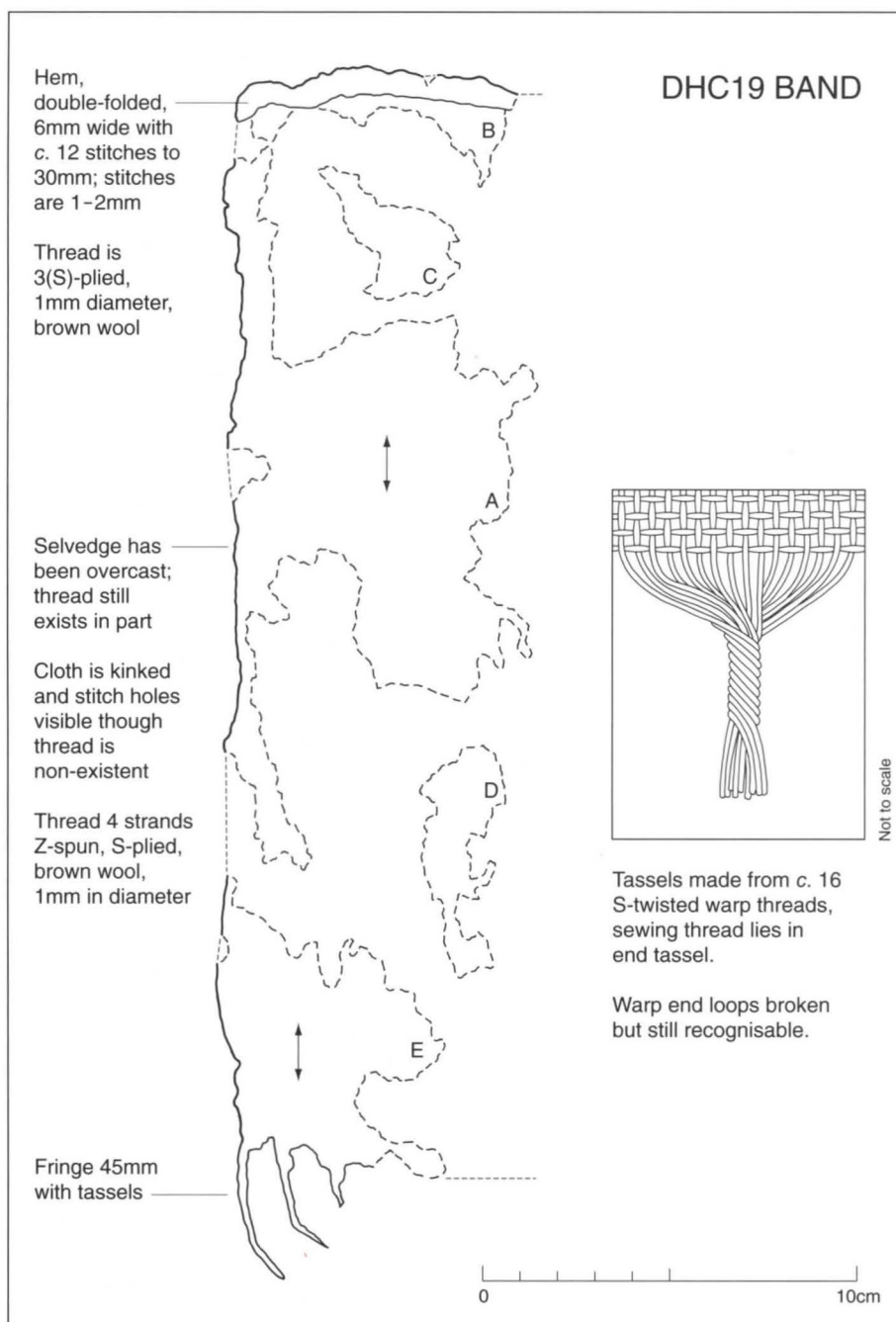


Fig. 29. *DHC19* (E190:3275).

Selvedge loops: One?
 Fringes: One, 45mm long.
 Dye: Analysis undertaken; traces of iron mordant.
 Sewing: Yes.

DHC20. *BAND* Fishamble Street III E190:3325 (Fig. 30)
 Organic layer L353, plot 8, level 11; early/mid-eleventh century.
 Fibre: Wool.
 Weave: Tabby, open, regular.
 Colour: Black 5YR 2.5/1.
 Condition: Actual: A) 185mm × 85mm, B) 80mm × 40mm, C) 50mm × 15mm. Estimated original: 280mm (minimum) × 85mm (minimum) including fringe.
 Warp Z Weft Z
 Spin direction: Z Z
 Degree of spin: Loose Medium/Loose
 Yarn diameter: 0.19–0.21mm 0.18–0.26mm
 Threads per cm: 11–15 12–16
 Selvedges: Two.
 Selvedge loops: No.
 Fringes: One tassel, 20mm long.
 Dye: No analysis.
 Sewing: Yes.

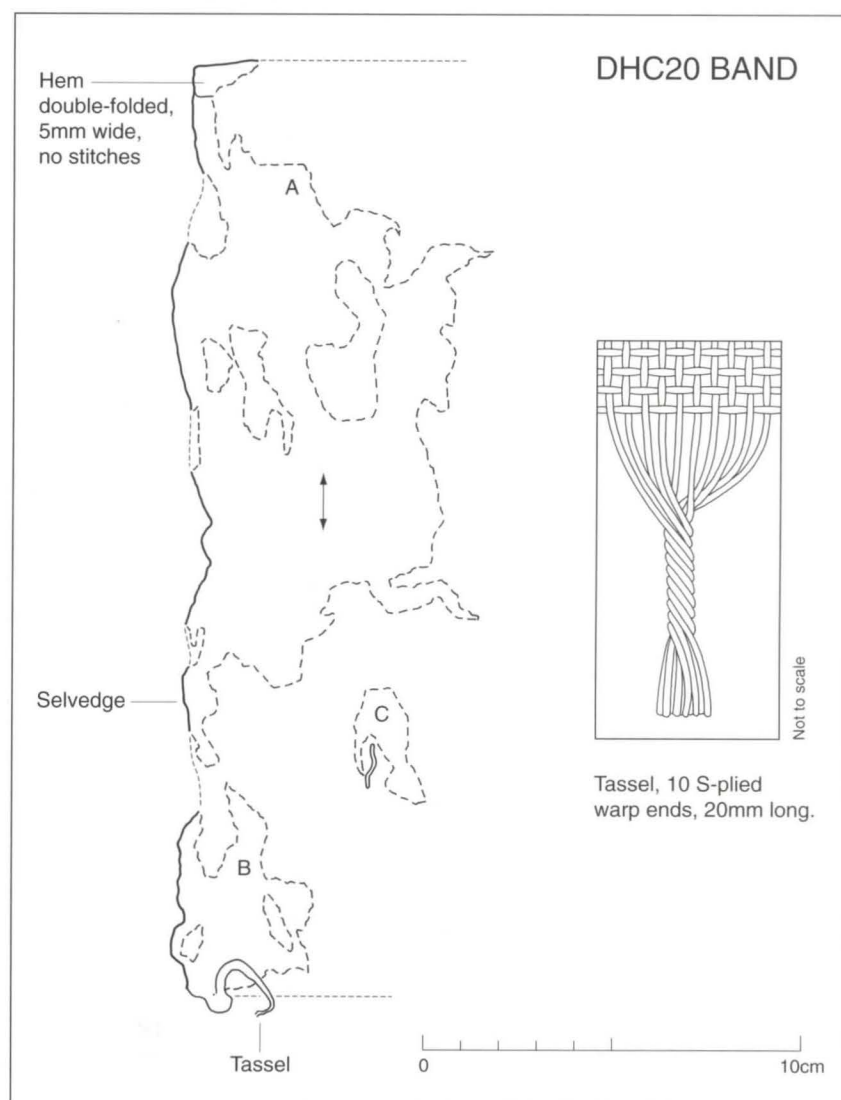


Fig. 30. DHC20 (E190:3325).

DHC21.

BAND Fishamble Street III E190:3416 (Fig. 31)
Sod layer L381, plot 8, level 9 or 10; late tenth/early eleventh century.

Fibre:	Wool.
Weave:	Tabby, open, regular, springy to touch.
Colour:	Black N2/0.
Condition:	Poor.
Dimensions:	Actual: 385mm × 120mm.
	<i>Warp</i> <i>Weft</i>
Spin direction:	Z Z
Degree of spin:	Medium Medium
Yarn diameter:	0.24–0.27mm 0.24–0.25mm
Threads per cm:	11–17 11–17
Selvages:	Two.
Selvedge loops:	No.
Fringes:	One, 30–40mm long.
Dye:	Analysis undertaken; traces of iron mordant.
Sewing:	Yes. Traces of hem at textile bottom. Fringes lie closely in as if rolled under to make doubled hem. End two may have fringe tucked under hem, but poor condition precludes identification.

DHC22.

BAND Fishamble Street III E190:7232 (Fig. 32)
Organic layer L562 in house FS 88, plot 9, level 10; early eleventh century.

Fibre:	Wool.
Weave:	Tabby, open, regular.
Colour:	Dark brown 7.5YR 3/2.
Condition:	Medium/poor.
Dimensions:	Actual: A) 90mm × 120mm, B) 130mm × 60mm, C) 100mm × 40mm, D) 30mm × 80mm. Estimated original: (minimum) 250mm × 120mm.
	<i>Warp</i> <i>Weft</i>
Spin direction:	Z Z
Degree of spin:	Loose Loose
Yarn diameter:	0.18–0.22mm 0.20–0.24mm
Threads per cm:	13–17 17–21
Selvages:	Two, but not joined. Paired warps still in place at selvedge to width of 1.2mm.
Selvedge loops:	No, because paired warp ends survive at selvedge.
Fringes:	No.
Dye:	Analysis undertaken; traces of iron mordant.
Sewing:	Yes.
Comments:	Small piece of thick woollen cord found with textile.

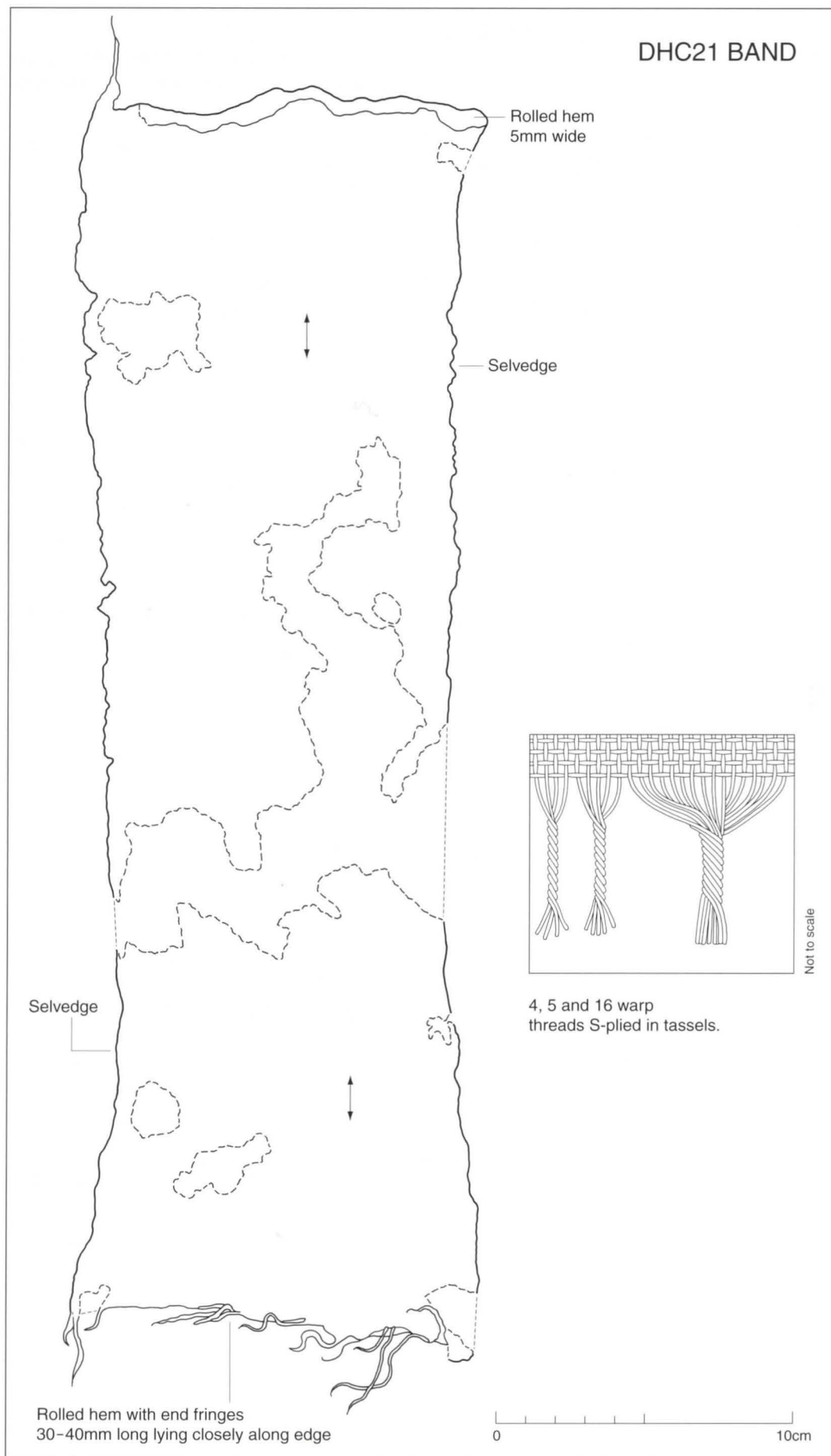


Fig. 31. DHC21 (E190:3416).

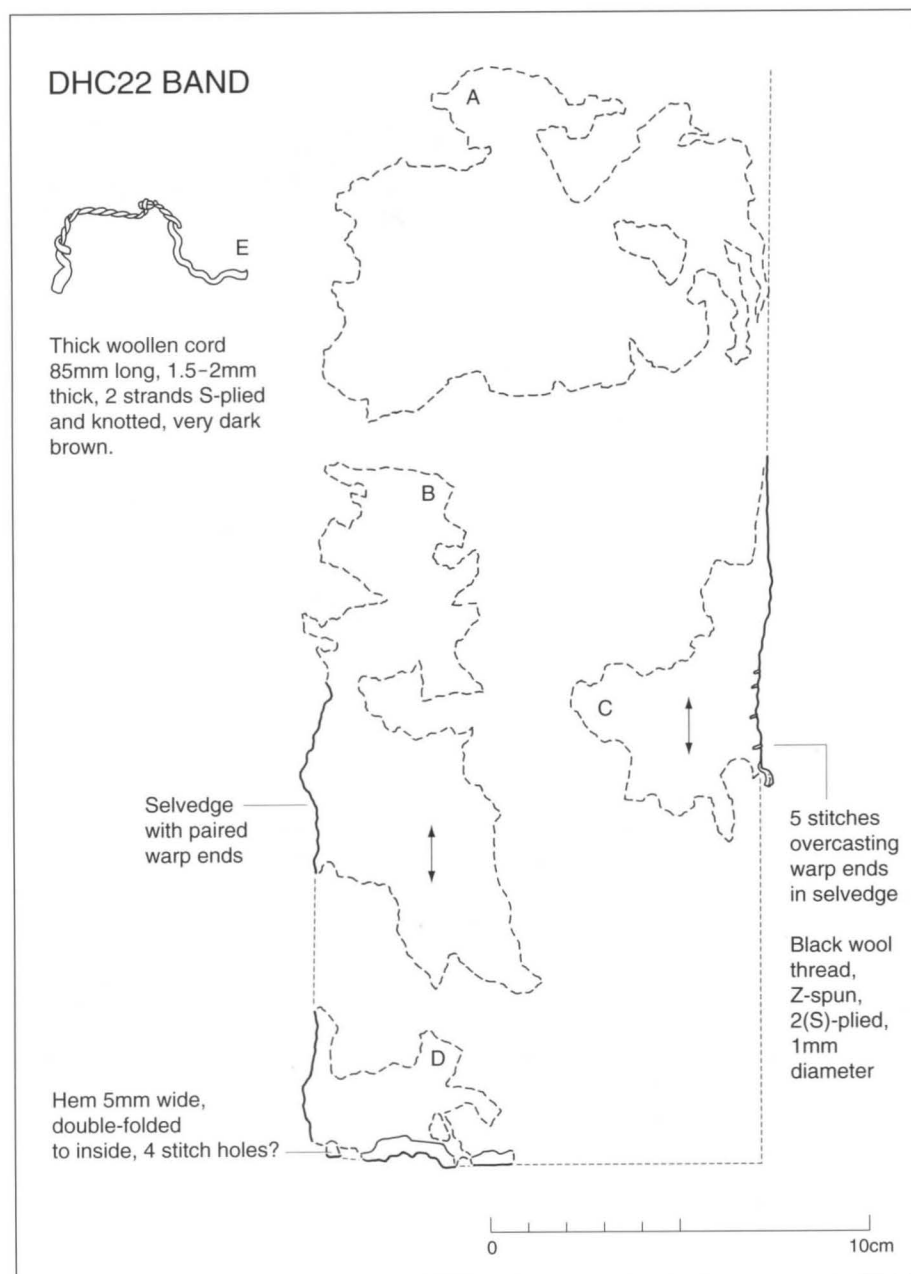


Fig. 32. DHC22 (E190:7232).

DHC23.

Fibre:
Weave:
Colour:
Condition:
Dimensions:

Spin direction:
Degree of spin:
Yarn diameter:
Threads per cm:
Selvedges:
Selvedge loops:
Fringes:
Dye:
Sewing:

BAND John's Lane E173:4403 (Fig. 33)

No context; date uncertain.

Wool.

Tabby, open, warp ends kinked in spinning.

Very dark grey 5YR 3/1.

Medium/poor.

Actual: A) 290mm × 170mm, B) 60mm × 150mm. Estimated original: (minimum) 350mm × 170mm including fringe.

Warp

Weft

Z

Z

Medium

Medium/Loose

0.20-0.28mm

0.21-0.26mm

11-15

11-13

Two.

No.

Two, end one 30mm long, both tucked into hems.

Analysis undertaken; chlorophyll present?

Yes. Hems seem gathered: on one the present 80mm width can be drawn out to 105mm, on the other the present 150mm width can be drawn out to 170mm. This is consistent with ties being sewn onto hems.

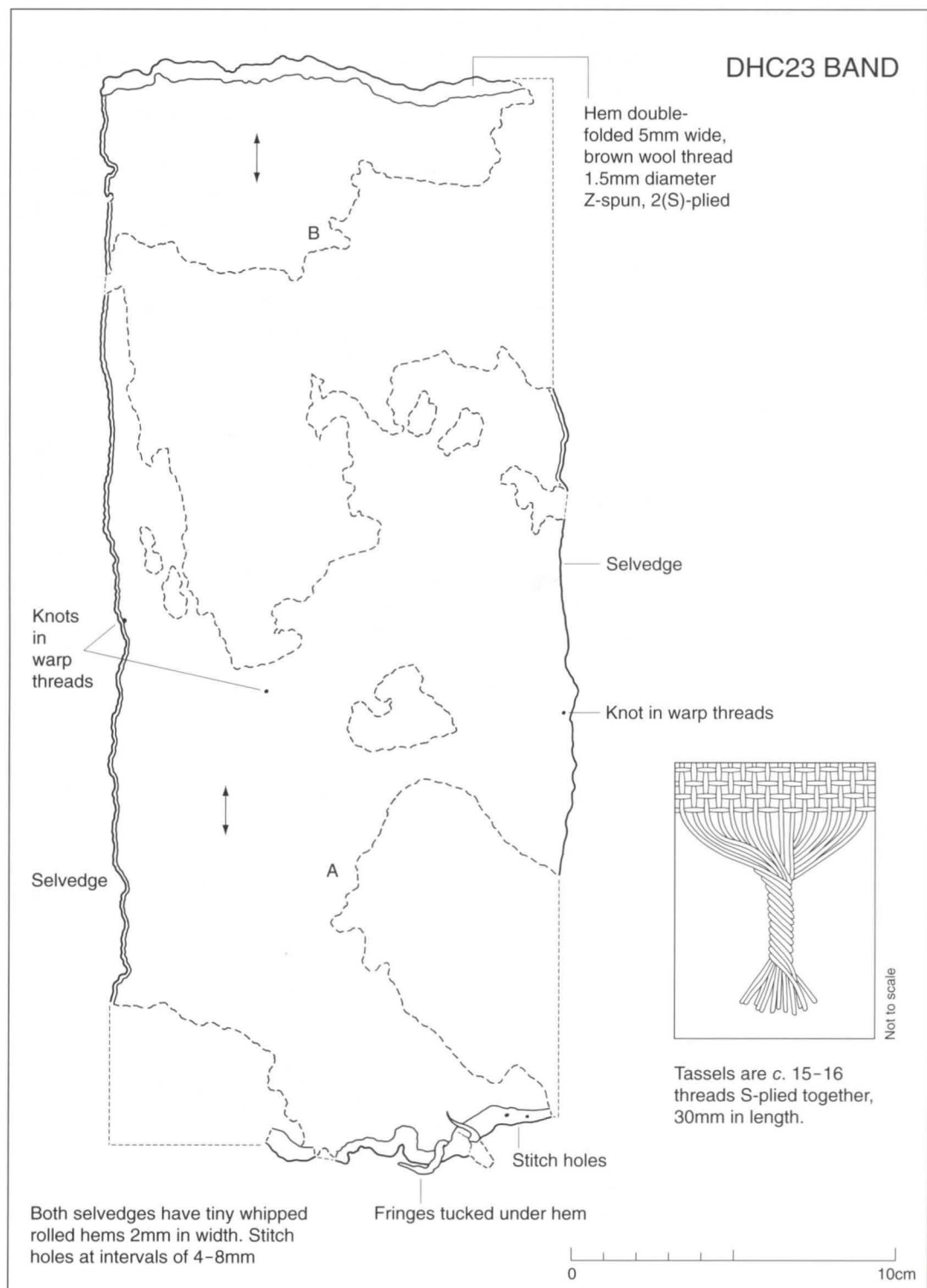


Fig. 33. DHC23 (E173:4403).

DHC24. *BAND (AND TIE)* Fishamble Street II E172:11845 (Pl. IV; Fig. 34)
 South-west corner, house FS 51, plot 3, level 8; late tenth century.

Fibre: A) Band, B) Tie, silk.

Weave: A) Tabby, open. Complete loompiece. Both warp and weft systems show kinking and corkscrew effect from spinning.

Colour: A) Dark reddish brown 5YR 3/3.
 B) Light yellowish brown 2.5Y 6/4.

Condition: A), B) Good.

Dimensions: Actual: A) 350mm × 120mm (before stitching 370mm × 120mm), B) two lengths of silk floss threads knotted together: 100mm × c. 5mm + 110mm × c. 5mm.

	<i>Warp</i>	<i>Weft</i>
Twist direction:	A) Z	Z
	B) S-twisted	n/a
Degree of twist:	A) Medium/Loose/Tight	Medium/Loose/Tight
	B) Loose	n/a
Yarn diameter:	A) 0.11mm	0.09mm
Threads per cm:	B) 23–37	24–39
Selvages:	A) Two.	
Selvedge loops:	A) 3mm long.	
Fringes:	A), B) No.	
Dye:	A) No analysis undertaken, since piece is complete. B) Analysis undertaken; no dye detected.	
Sewing:	A) Yes. No stitches remain but ends of band were formerly hemmed.	
Comments:	Band A) is a complete loompiece with both ends and both selvages intact; B) may be a tie for the back of head band A). Hair caught in textile; not identifiable as human.	

DHC25. *BAND* Fishamble Street II E172:15235 (not illustrated)
 Open area F1253, west of house FS 10, plot 3, level 3; mid-tenth century.

Fibre: Silk.

Weave: Tabby, open, regular.

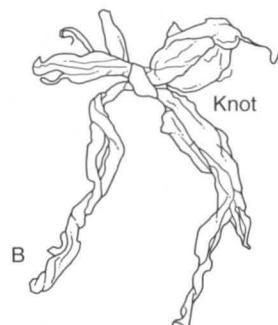
Colour: Dark reddish brown 5YR 2.5/2.

Condition: Poor.

Dimensions: Actual: A) 90mm × 120mm, B) 220mm × 90mm, C) 80mm × 50mm, D) 45mm × 110mm, E) 140mm × 90mm, F) 70mm × 30mm. Estimated original: 580mm (minimum) × 100mm including fringes.

	<i>Warp</i>	<i>Weft</i>
Twist direction:	Z	Z
Degree of twist:	Loose	Loose
Yarn diameter:	0.15–0.18mm	0.17–0.25mm
Threads per cm:	17–19	8–12
Selvages:	Two, one probable; reinforced area c. 5mm wide where warp threads are 20 to 4mm, more than twice the frequency of main cloth.	
Selvedge loops:	c. 3mm long.	
Fringes:	Two, c. 45mm long.	
Dye:	Analysis undertaken; madder detected.	
Sewing:	No.	
Comments:	Hair caught in textile; not identifiable as human.	

DHC24 BAND



It is possible that B was originally attached to A forming a head band. The hems on A are still gathered in (although the stitching is not preserved) as if to attach a tie.

Strands loosely S-twisted and knotted in the centre.

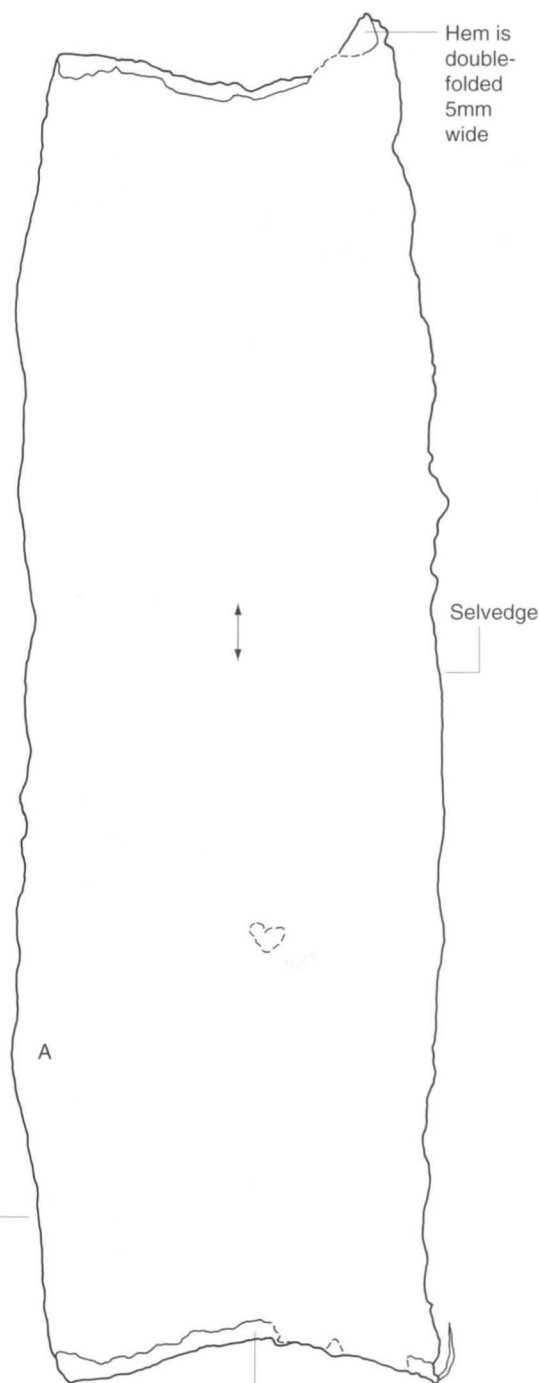
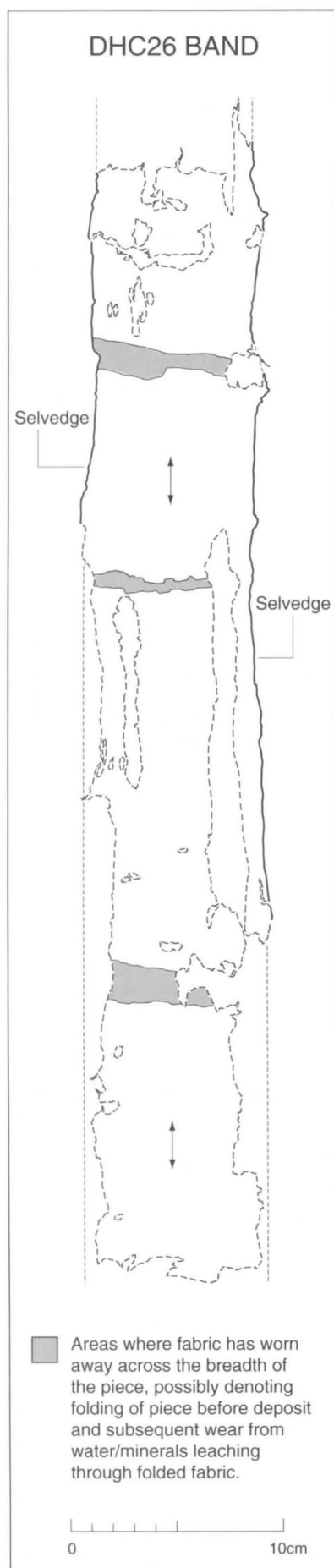


Fig. 34. DHC24 (E172:11845).



DHC26.

Fibre: Silk.
 Weave: Tabby, regular.
 Colour: Dark reddish brown 5YR 3/2.
 Condition: Good.
 Dimensions: 570mm × 80mm.
 Warp Weft
 Twist direction: Z Z
 Degree of twist: Loose Medium/Loose
 Yarn diameter: 0.14–0.16mm 0.21–0.25mm
 Threads per cm: 32–37 25–27
 Selvages: Two.
 Selvedge loops: No.
 Fringes: No.
 Dye: Analysis undertaken; no dye detected.
 Sewing: No.
 Comments: Hair caught in textile; not identifiable as human.

DHC27.

TWO BANDS, KNOTTED Fishamble Street II E172:14366 (Fig. 36)
 Organic layer L998, plot 6, level 1; early tenth century.
 Fibre: Silk.
 Weave: Tabby.
 Colour: Brown 10YR 5/3.
 Condition: Good.
 Dimensions: Band A) 20mm × 230mm, Band B) 65mm × 160mm.
 Warp A) B) Weft A) B)
 Twist direction: None None
 Degree of twist: None None
 Yarn diameter: 0.11–0.12mm 0.45–0.50mm
 Threads per cm: 38–49 19–24
 Selvages: A) One. B) One. Reinforced selvages of 47 warp ends, same diameter as weft picks, form evenly woven bands 15mm deep.
 Selvedge loops: No.
 Fringes: No.
 Dye: No analysis.
 Sewing: Yes.
 Comments: Two bands knotted together. Warp thread density in main pieces of textile uncertain, since warp ends have bunched together, giving an artificially high number.

Fig. 35. DHC26 (E190:7186).

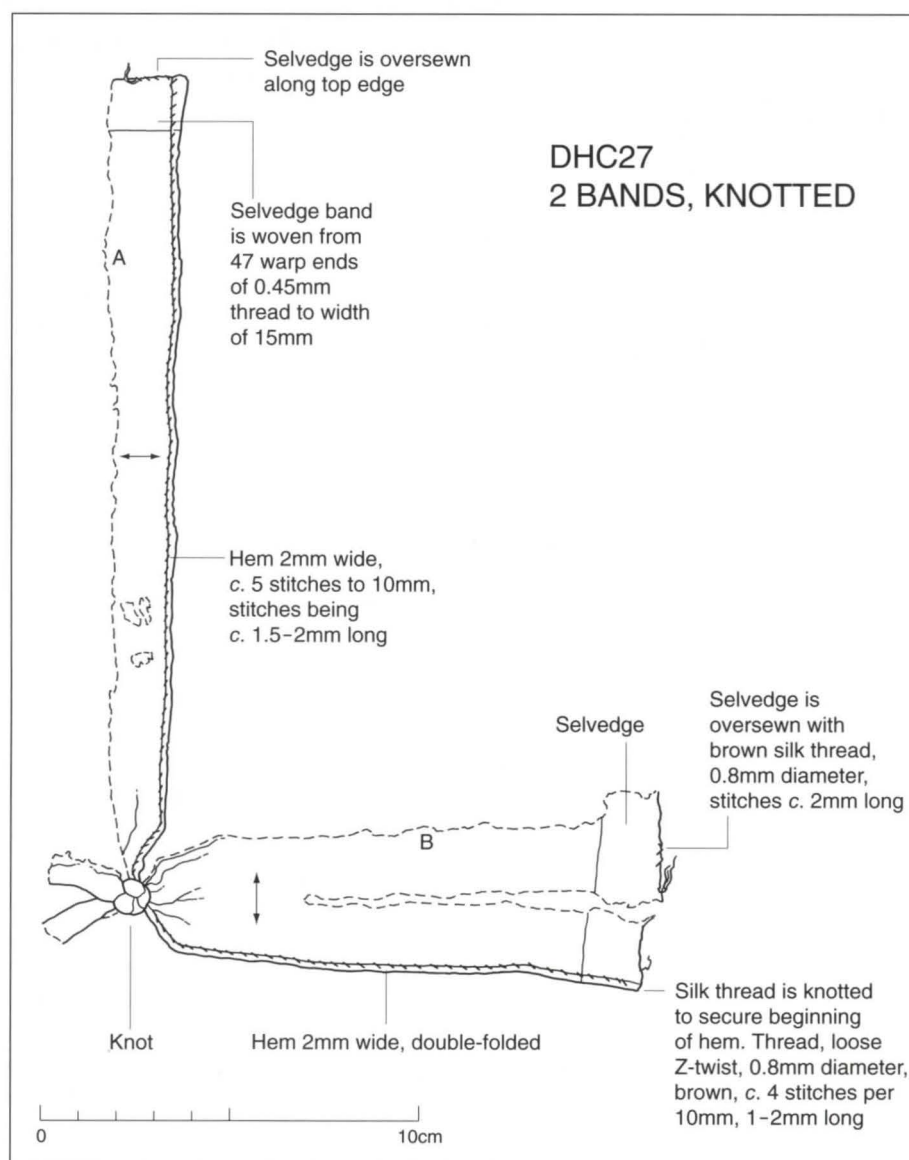


Fig. 36. DHC27 (E172:14366).

DHC28.

THREE BANDS, KNOTTED Fishamble Street II E172:11916 (Fig. 37)

Organic layer L1041 in house FS 41, plot 4, level 7; mid-/late tenth century.

Fibre:	A) B) C) Silk.	
Weave:	A) B) C) Tabby, very regular.	
Colour:	A) B) C) Yellowish brown 10YR 5/4.	
Condition:	A) B) C) Good.	
Dimensions:	Band A) 120mm × 20mm, Band B) 100mm × 120mm, Band C) 160mm × 35mm.	
	System 1 A) B) C)	System 2 A) B) C)
Twist direction:	None	None
Degree of twist:	None	None
Yarn diameter:	0.29–0.31mm	0.12–0.18mm
Threads per cm:	36	30–32
Selvages:	Possible but edges are frayed.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	No.	

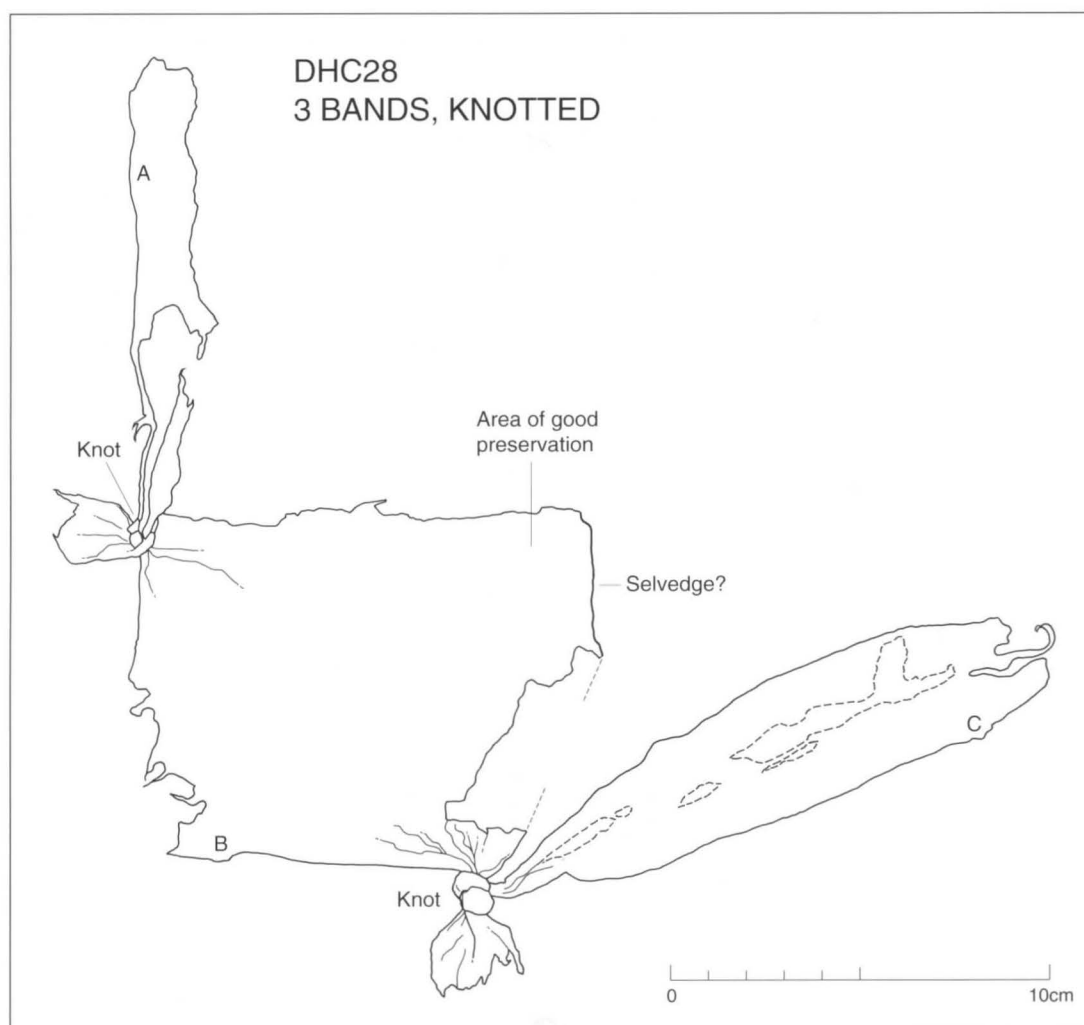


Fig. 37. DHC28 (E172:11916).

Comments:

Three lengths of cloth from same textile knotted together, no similarity between their widths. Part of C) may be missing. Width of B) similar to other knotted bands. Total length of bands is 420mm. Hair caught in textile; not identifiable as human.

DHC29.

SCARF/BAND Fishamble Street II E172:13621 (Fig. 38)
Dungy organic layer L1218 in house FS 16, plot 4, level 4; mid-tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	Actual: 300mm × 145mm. Estimated original: (minimum) 300mm × 145mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Medium
Yarn diameter:	0.15–0.19mm	0.15–0.17mm
Threads per cm:	15–19	13–15
Selvages:	Two.	
Selvedge loops:	2mm long, twisted.	
Fringes:	No ends of cloth remaining.	
Dye:	No analysis.	
Sewing:	One possible stitch at selvedge.	

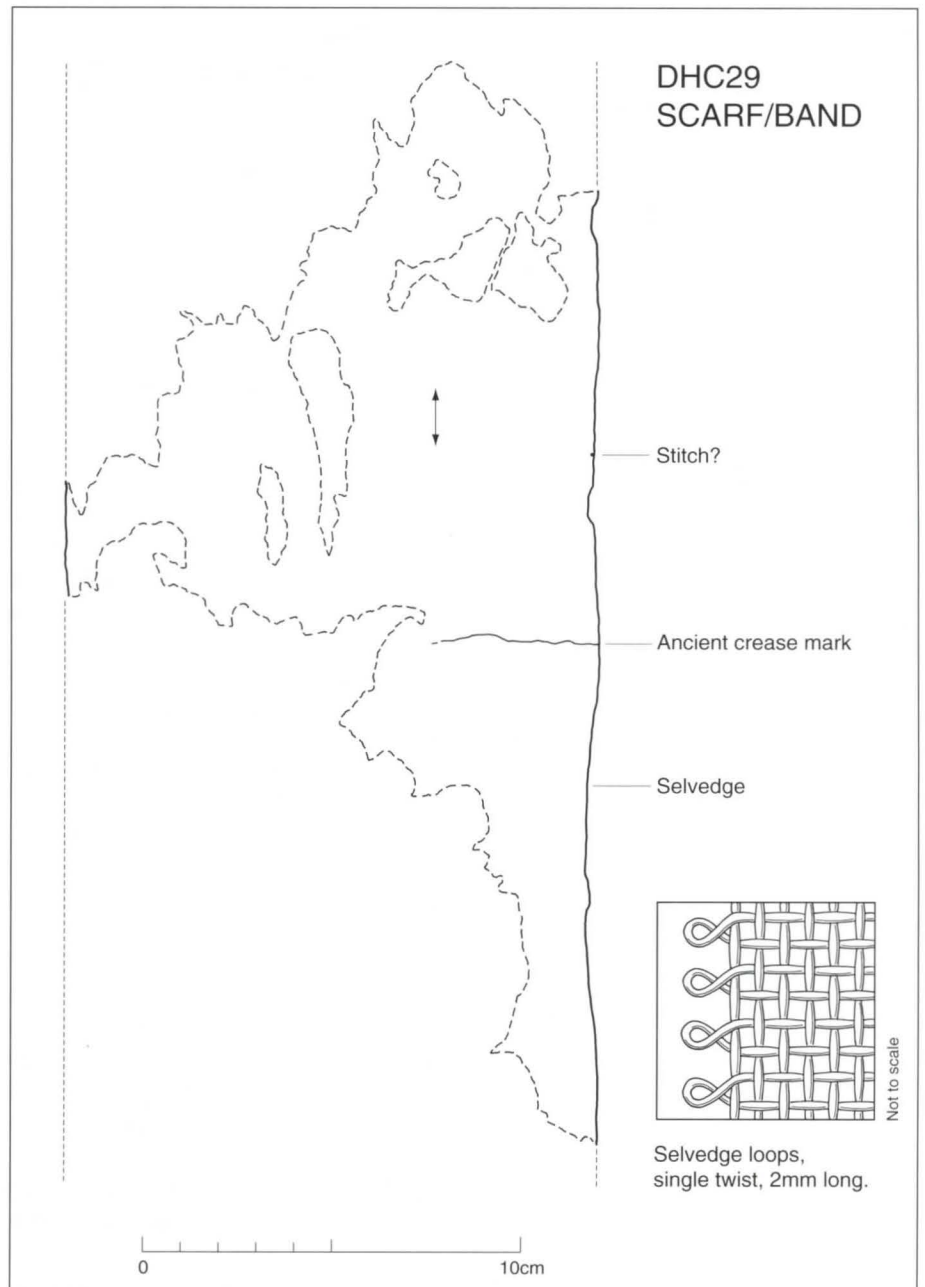


Fig. 38. DHC29 (E172:13621).

Caps

Caps and cap fragments

There are twelve caps (three in silk and nine in wool) and three remnants (one silk and two wool) that may perhaps be recognised as caps by comparison with the complete pieces (Fig. 39). One further wool piece (DHC 43) may be either a cap or a scarf. The caps, whether in silk or wool, were made to conform to the same basic pattern with certain variations in length, width and sewing techniques (Fig. 40). The most common mode of construction was for the front edge of the cap to be rolled, or folded and sewn, or for a cord to be oversewn onto that selvedge. The bottom edges were then double folded to form a hem *c.* 5mm wide, and hem-stitched. The two back edges were oversewn together from the outside after the cloth had been neatly turned inwards to a depth of between 2mm and 25mm. The oversewing from the outside may not continue to the top of the cap but may change to a running stitch to make a dart curving inwards from about 50–100mm below the peak. This shapes the cap to the contours of the head. The stitched curve is absolutely typical of the cap pattern. The fabric in the peak was not turned inwards to produce a rounded effect on the head—rather, the running stitch seems to have been on the outside of the fabric leaving the peak of the cap standing up and visible to other people. There are variations within this basic pattern; for example, in DHC32 (Pl. VII, Fig. 52) the back of the cap has been oversewn on the outside right up to the peak, and the curved dart stitched in afterwards with a running stitch. In DHC40 (Pl. VIII, Fig. 60) stitch-holes can be seen marking out the typical curve (the sewing threads have disintegrated). However, there are no stitch-holes where the back edges would have been sewn together, although these have been carefully finished by being individually rolled and sewn. This suggests that the back was never sewn together.

Ties were sewn to the two front bottom edges of the caps. Although none of these remain, the fabric in these areas is pulled forward from ribbons or braids having been tied in place. Among other textile remains from Fishamble Street/John's Lane and the High Street pit are narrow strips of braid and many silk ribbons that could have served as ties (Pritchard 1988, 157; Wincott Heckett forthcoming (a)).

The wool caps and cap fragments were made from narrow pieces of material whose average width of *c.* 160mm is established by the existence of both selvedges in five examples, and perhaps on another two pieces. The original length of the pieces of cloth cannot be determined because the sewn hems hide the ends and any traces of either cut threads or looped warp ends.

When the wool caps were made up the makers took advantage of the narrow loom width of the textiles. On the front edge of DHC32 a fine rolled hem was whip-stitched in place, made possible by the firm selvedge on the cloth; in DHC30 (Pl. IX, Fig. 51) and DHC33 (Pl. X, Fig. 53) a cord was whip-stitched to the front selvedge providing an attractive, strong finish. In four of the caps the selvedges forming the back have been turned under to widths of 2mm, 5mm, 15mm and 25mm (DHC36, DHC35, DHC34, DHC32; Figs 56, 55, 54 and 52; Pl. VII) and the back edges have then been oversewn together. In only one case (DHC31—not illustrated) has the back of the cap been matched to the curve of the lower part of the head above the neck; here the material was cut away on the inside of the cap with the edges left unfinished. On this cap the tie area was pinch-pleated to strengthen it and perhaps coincidentally to add a decorative touch. In comparison with the others the cut is more complex and more like that of caps from the thirteenth century and after. However, DHC31 dates from the mid- to late tenth century.

In wool cap DHC32 (Pl. VII, Fig. 52) a large patch has been sewn to the inside of the right-hand part. The sides of the patch have been turned under and it has been slip-

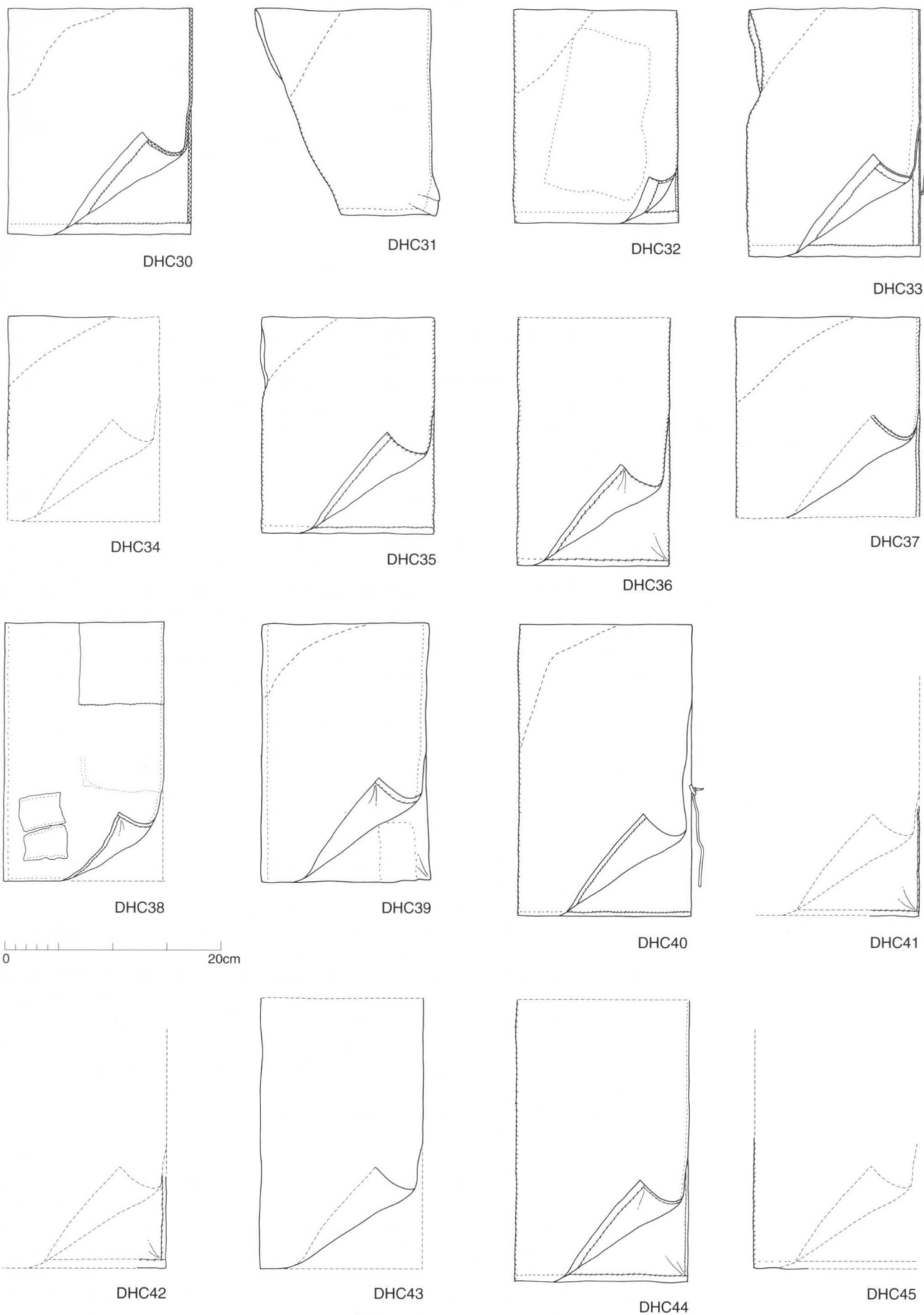


Fig. 39. *Diagrams of caps and cap fragments.*

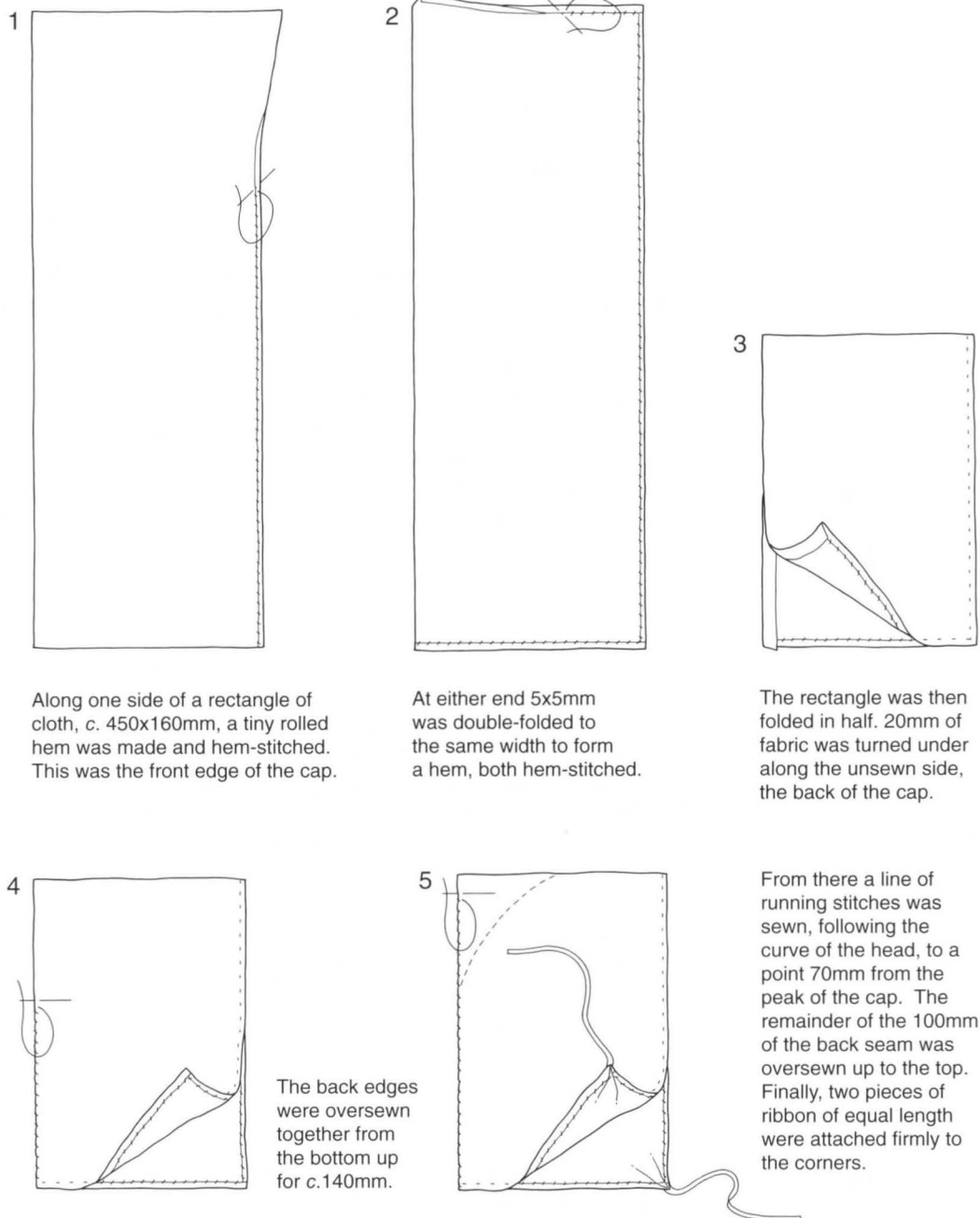


Fig. 40. Basic cap pattern.

stitched to the inside of the cap. If the patch had been put on to cover a hole, placing it like this on the inside would leave the rough edges of the tear exposed to view on the outside, which is contrary to usual sewing practice. Placing the patch as it is means that the smooth surface would have been against the wearer's ear. This may suggest that the patch was put on to provide extra protection and warmth, or to strengthen a threadbare rather than a torn area. It may also be that it was unimportant that ragged edges were left on the outside. This would be true if the cap was worn under another headcovering or indeed as a night cap.

Of the three silk caps, DHC37 (Pl. XI, Fig. 57) and DHC39 (Pl. XII, Fig. 59) were made of Z/no twist, and DHC40 (Pl. VIII, Fig. 60) of Z/Z twist yarn. There is only one selvedge on two of the caps (one Z/Z and one Z/no twist) and none on the other. This contrasts with the wool caps, where the full width from selvedge to selvedge has been used. As the width of the silk pieces matches that of the wool, it looks as if the silks were specifically cut down and stitched to produce the preferred width of 160–170mm. This may well mean that the first caps sewn to this pattern were made from wool cloth that was purpose-woven to the particular width required.

One silk cap of Z/no twist yarn, DHC37, has the edges double folded into hems 2mm × 2mm, the front using the selvedge, the back being cut and sewn. The present length of

390mm may not represent the original since the possible lower ends of the cap have no stitching or hemming.

The other cap of Z/no twist yarn, DHC39, has double patches reinforcing the tie area; a selvedge occurs on one of them but not on the cap itself. Only one side of the cap still exists to the bottom edge but the back top section has survived, showing the characteristic shaped dart sewn from outside, leaving unsewn the back edges of the cap above the curve. The front edges are finished with a double hem of 3mm \times 3mm and the back edge has a single folded hem with the raw edge caught down by hem-stitching. The Z/Z twist silk of DHC40 is a lightweight veil-like weave, which does not seem to be suitable for daily wear or to stand the strain of being tied firmly under the chin. Perhaps this cap was worn on dressed hair and pinned in place, or tied loosely at the back of the head. It has been darned in one spot in an irregular, criss-cross fashion, and there seem to be stitch-holes on the fabric, perhaps from a patch. A tie that has been knotted back onto a frayed strand of the cap was made from a strip of the same cap material, folded and stitched and then attached about 140mm from the top. This depth between the cap top and the tie would not be big enough for an adult's head. The original cap size of 270mm would have been sufficient. This suggests that the cap was first used by an adult and later, when it was much worn, it was reused by a child. There is a vivid contrast between the fineness of the silk fabric and the 'make do and mend' quality of the later repairs and adaptations.

Part of a wool cap, DHC33 (Pl. X, Fig. 53), has been decorated with a self-coloured cord sewn to the front edge. Surplus material has been cut away from the outside of the line of stitching that creates the shaping for the back of the head, and the edges have been overcast to prevent fraying. The bottom hem is turned under twice to a width of 9mm.

Another wool cap, DHC34 (Fig. 54), is a fragment whose top and back edges survive with the selvedges turned inwards to a width of 15mm. A single stitch now holds the two back edges together. In DHC36 (Fig. 56) only a small piece of the right-hand side is sewn to the larger part remaining of the left-hand side. The front selvedge of the left-hand side has been overcast with dark-coloured thread. The bottom edge has a double folded hem and the back selvedge is overcast. There is also a cap, DHC35 (Fig. 55), with front edges oversewn, a lower hem double-folded 5mm on 5mm and back edges oversewn, but in this case the upper selvedges are left unstitched and the dart is stitched from the outside.

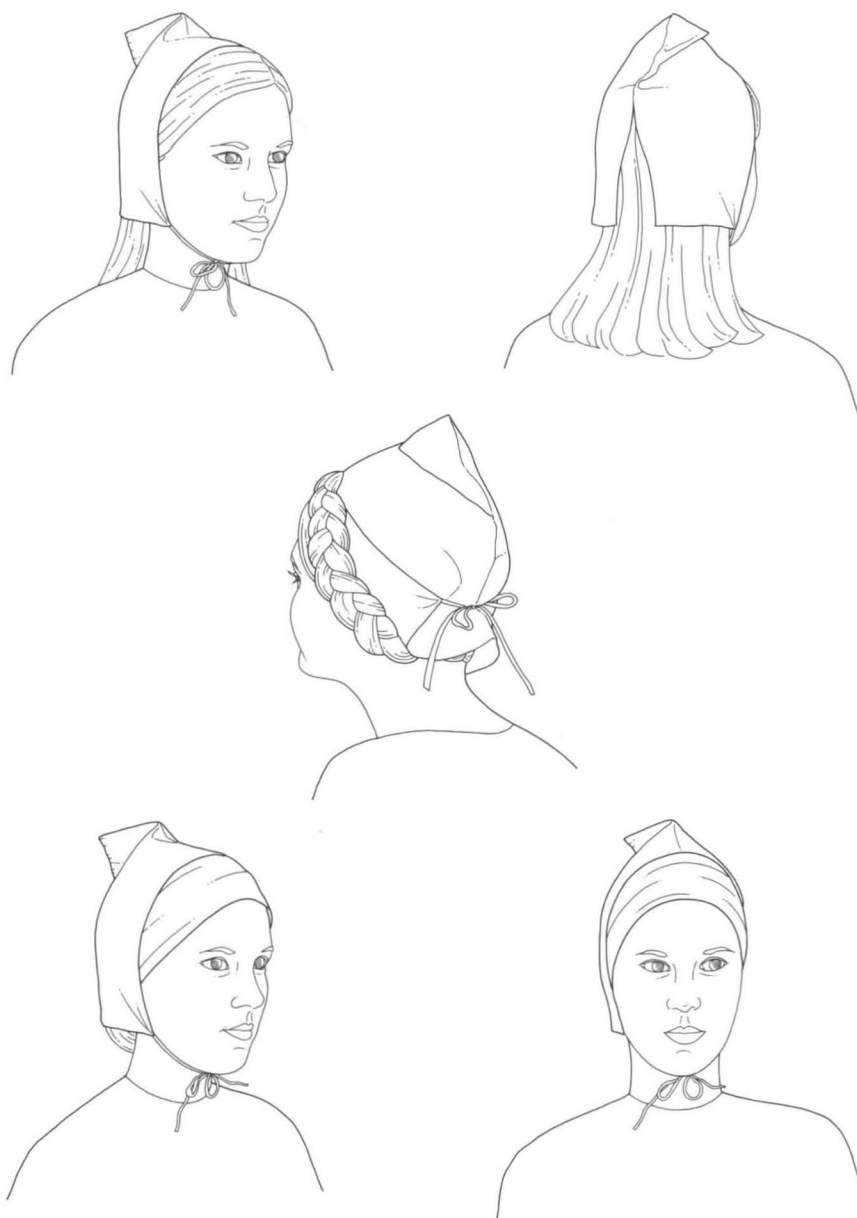
Five other pieces may be parts of caps. DHC38 (Pl. XIII, Fig. 58) is a patched silk of Z/no twist yarn whose dimensions of 210mm \times 150mm would be in line with those for one half of a cap. In the top left corner where the 'peak' would be, some material is missing. This also occurs in some other caps, either from wear or from surplus material having been cut away. The bottom right-hand corner of the textile is pulled forward, as happened in the tie area of the known caps. Two other fragments, DHC41 (Fig. 61) and DHC42 (Fig. 62), are too small to be immediately identified as caps, but both have the typical sewing techniques and characteristics, i.e. doubled hems of the same widths and rolled and stitched front selvedges. They are also made from exactly the same type of wool cloth as the known caps.

A few years after the Fishamble Street excavations were completed two pieces of very fine Z/Z spun wool tabby cloth, DHC44 (Fig. 64) and DHC45 (Fig. 65), with the same particular sewing details and shape, were found in a Viking Age refuse pit in the High Street. From the knowledge gained with the previous finds it seems that DHC44 is a cap, and DHC45 is a likely cap fragment. This strengthens the case for the caps being generally worn in Dublin. Ribbons and a possible cap tie were also found in the excavation (Wincott Heckett forthcoming (a)). DHC43 (Fig. 63) is of more or less suitable dimensions for a cap but is in eleven pieces and in poor condition. It may also be a scarf. One selvedge seems to have been overcast, and a patch was found with the silk cloth. It has been included here because human hairs were caught in the cloth (see Appendix 5.1).

How were the caps worn?

The caps could have been used in several ways. In principle we do not know whether they were worn by both men and women, but it is more likely that they were used by women (see Fig. 41). Since the fabrics are lightweight and of fine quality they were perhaps worn

Fig. 41. *Different ways of wearing caps.*



on special occasions by women and children. Certainly DHC40 (Pl. VIII, Fig. 60), a silk cap, has been reused by a child (the tie was moved to fit a smaller head, as already described). It seems that in two cases, DHC39 (Pl. XII, Fig. 59) and DHC40 (Pl. VIII, Fig. 60), the caps were not sewn up the back, perhaps to show off coiled or knotted hair.

It may be that the little caps were worn under the wimples seen in Anglo-Saxon and Byzantine illuminated manuscripts. Such caps were likely to be made of linen, which was readily available, but there is no reason why wool and silk should not have been used. Since there is a range of sizes, perhaps their use was not limited by age.

Features like the interior patching on DHC32 (Pl. VII, Fig. 52), which left a rough hole on the outside of the cap, and the cut-away piece from the peak of DHC33 (Pl. X, Fig. 53) may mean that the caps were not intended to be seen. The fact that the peak itself is generally left on the outside of the cap rather than being turned to the inside suggests that the caps were worn underneath some other headcovering. If so, it is also possible that they were nightcaps. The patching, darning, cutting away and reuse of cloth may have been done by later owners long after the original wearer had passed the caps on to children or servants. Perhaps they were worn during the day when new and used as nightcaps when old, just as on a cold night we might wear an old cardigan in bed.

Another suggestion is that the caps were worn under leather or metal helmets, since even with interior padding a soldier's ears would be vulnerable to rubbing. The

archaeological evidence for helmets in the tenth and eleventh centuries is slight; the Sutton Hoo helmet, dating to the mid-seventh century (Bruce-Mitford 1978, 38–42, 208, 220–3), is too far removed in time and type from Hiberno-Norse Dublin. The Anglo-Saxon helmet (c. AD 750–75) discovered in York (Hall 1984, 38–42) has earflaps, and it can be seen that some protection for the head from abrasive friction was needed. There it is suggested that a separate leather or wool cap would have been worn, since there are no traces of protective lining remaining within the helmet. However, it seems unlikely that an under-cap of the Dublin pattern would be worn with the ribbons visibly tied under the chin. If the evidence of the Bayeux 'Tapestry' is reliable, some Norman helmets contemporary with the later occupation of Wood Quay do leave the ears uncovered (Gibbs-Smith 1973, pls 53, 54).

The Swedish Viking helmet from Vendel, Upland (held in the Statens Historiska Museet, Stockholm), is rounded and quite shallow with attached ear-, cheek- and nose-guards. Another shallow but conical helmet with nose-guard is carved on a Viking head that forms the top of a bone stick from Sigtuna, Sweden. Here the ear and hair can clearly be seen well below the helmet (Brønsted 1980, pl. 23B). The twelfth-century knights and warders of the Norwegian-influenced Lewis chess set are certainly not wearing caps tied under the chin beneath their helmets and ear-guards (Stratford 1997, 20–2).

The light wool cloth of the Dublin caps seems too flimsy to stand up to friction from leather or metal coverings. The scarves could have been worn knotted around the head under a shallow helmet. Textiles were used in helmets in the early sixth century: a piece of Coptic tapestry was used as the lining for the neck-guard of the helmet in the grave of a young Frankish noble buried under the floor of Cologne Cathedral (Bender Jørgensen 1987).

Although in this study the caps and scarves have been documented and catalogued separately, the dimensions of the loom pieces are not greatly disparate. There is some difference in the widths used for either caps or scarves (see Tables 1 and 3). These similar narrow rectangular pieces could well have a common ancestry, for the cap is only a refinement of the scarf with added sewing details and attached ties. There seems to have been a basic wool loom piece that was used for headcoverings.

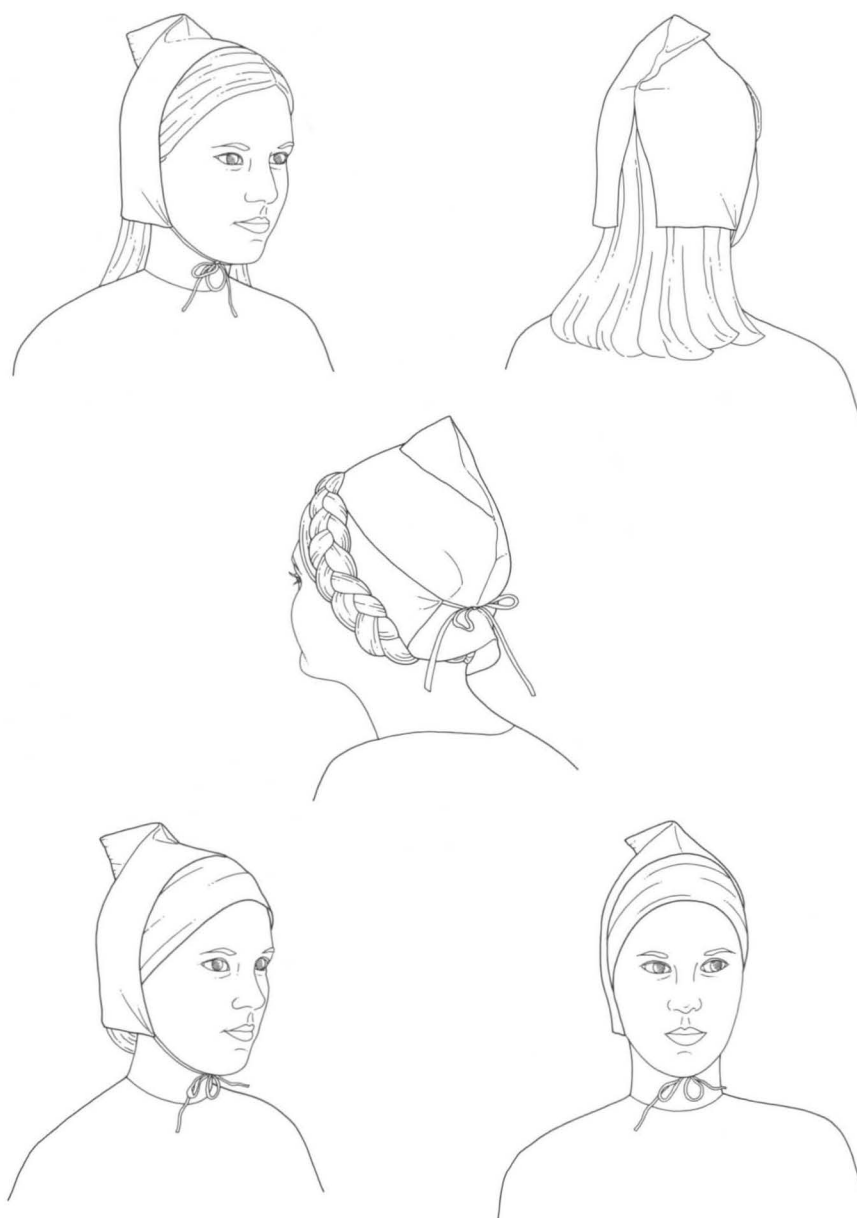
It is difficult to judge how hard-wearing the cap fabrics were originally. The open weave and thin yarn used to make the wool cloth and the light quality of the silks mean that with daily use the ties would quickly pull and tear the corners of the caps. This may suggest that they were only loosely tied. The Z/no twist tabby silk is the most resilient material used, but even here the delicacy of the cloth makes it likely that the hair was dressed so that the cap could be lightly tied and perhaps pinned in place. Initially the caps may have been kept for special occasions and only later worn more generally, or passed on to other people.

The numbers of caps, both in wool and silk, surviving from ten of the thirteen houses and a refuse pit in Dublin suggest an accepted fashion for the townspeople. Since the wool caps use the whole width of the cloth and the silks have been cut, presumably to conform to this size, it is likely that the wool type was the original and the silks a luxury version.

The Irish and international context

Examples of contemporary caps or headcoverings come from York and Lincoln, from Birka, Sweden, and from Masku, Finland. The best material comparable to the Dublin finds is three or possibly four silk caps from York and Lincoln. Two pieces of Z/no twist silk identified as caps have been found in tenth-century levels in York (Muthesius 1982, 132–3; Walton 1989, 360–7). The cap found at 5–7 Coppergate is fragmentary and less securely dated than the other, which is complete but not intact and was recovered from 16–22 Coppergate. The third cap is from Saltergate, Lincoln (Muthesius 1982, 132–3). Another York Z/no twist silk (York 1349) may also be a cap (see Figs 42a–c, 43 and 44). The details of two Dublin caps made of silk cloth with Z/no twist yarn are shown in Table 4 with the other three caps, since they use the same type of tabby-weave cloth. Although there are small differences in the sewing details, the basic pattern is the same and all show the marks of the typical curve stitched at the back of the head. It is considered likely that

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Fig. 42a–d. Diagrams of silk headdresses from York and Lincoln: (a) 16–22 Coppergate, York, no. 1372; (b) 5–7 Coppergate, York, no. 651; (c) Saltergate, Lincoln; (d) 16–22 Coppergate, York, no. 1345 (copyright York Archaeological Trust for Excavation and Research Ltd, York).

Fig. 43a and b. Silk cap, no. 1372 from 16–22 Coppergate, York: (a) ways of wearing the cap; (b) cap before conservation (copyright York Archaeological Trust for Excavation and Research Ltd, York).



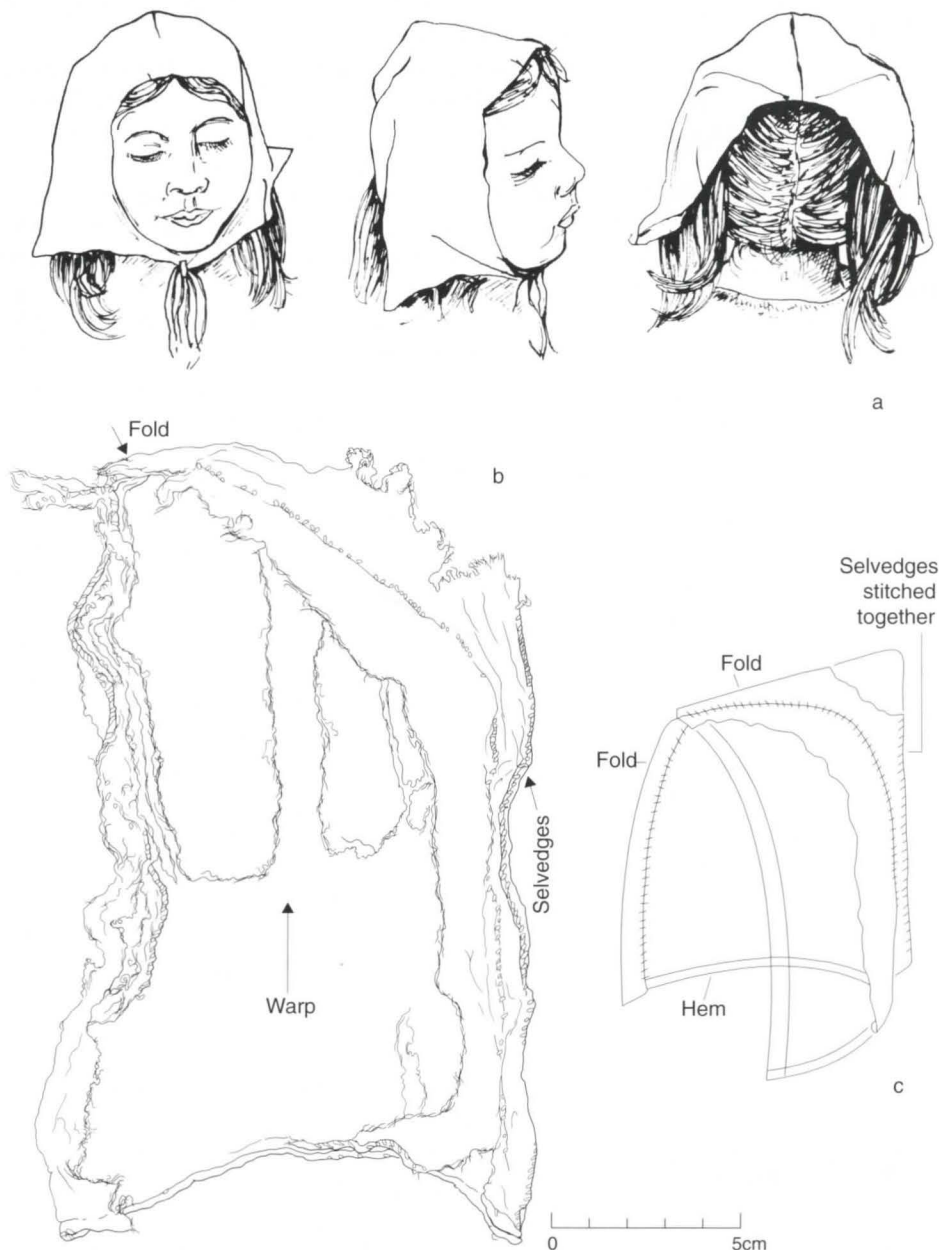


Fig. 44a-c. (a) Lincoln silk fragment worn as a head scarf (courtesy of Dr Anna Muthesius); (b) silk tabby, York 1349; (c) York 1349 reconstructed as child's headdress (copyright York Archaeological Trust for Excavation and Research Ltd, York).

the Lincoln cap (Fig. 44a) was not sewn up the back, as is true for DHC39 (Pl. XII, Fig. 59) and DHC40 (Pl. VIII, Fig. 60). The York and Lincoln examples are also cut at one edge with a selvedge at the other. There are striking similarities of date, general context, construction and raw material between these caps and the Dublin caps. Figures 42, 43 and 44 illustrate the patterns used, and details of measurements and construction are given in Table 4 for ease of comparison.

In addition to the Z/no twist caps from York there is a possible third example (1345), made from Z/Z silk, 400mm × 160mm in size (Walton 1989, 367) (Fig. 42d). It is directly comparable to DHC40 (Pl. VIII, Fig. 60), which is also made from Z/Z silk, 540mm × 160mm, thread density 32 × 23 per centimetre, with 39 paired warps at the selvedge, colour reading 'dark reddish grey'. The figures for York 1345 are thread densities of 28 × 20 per centimetre, with 39 paired warps at the selvedge, colour 'reddish purple' from madder and lichen purple dyes. The method of stitching on York 1345 is very similar to that used on the Dublin pieces, with the back selvages oversewn together; a second row of stitching follows the first but curves away from the selvedge across the folded material to create the same dart as that of the Fishamble Street and John's Lane caps (Fig. 44b and c). This piece is also cut down from the original loom piece and is used at a width of 160mm, which matches the other York and Lincoln examples and the Dublin caps. DHC40



Fig. 45. Reconstruction of twelfth-century AD headdress fastened at the nape of the neck, Masku, Finland.

(Pl. VIII, Fig. 60) is dated to the early to mid-tenth century, while York 1345 comes from levels dated to c. AD 930–75.

It seems clear that very similar silk cloth was used to make caps to a pattern common to Dublin, York and Lincoln. Muthesius has suggested that the York and Lincoln caps of Z/no twist yarn are so much alike as to have been made from the same length of cloth (Muthesius 1982, 133). It does not appear likely, however, that the Dublin caps were also cut from this one piece or that they came from a common workshop. The similarities between the silks used are great, but may well indicate a type of cloth commonly accessible to the trading communities of Dublin, York and Lincoln. The variations in reinforced selvages suggest that several different pieces were involved. All the dates for these caps fall within the tenth century; two other Z/no twist silk pieces, DHC47 (Fig. 67) and DHC59 (Pl. XIV, Fig. 79), are from the tenth and late tenth to early eleventh centuries; they also have reinforced selvages. The hundred years or so during which this particular type of cap was in use make it likely that the cloth was available for a considerable time.

In her description of the textiles used as clothing from the tenth-century burial site of Birka, Sweden, Geijer describes one silk piece as representing a '*rundes Kappchen*' or small cap at the back of the head, secured with a silver tablet-woven band (grave no. 946) (Geijer 1938, 146). This burial was female and in addition contained twin oval brooches, worn with the traditional Scandinavian pinafore dress. The silk survived at the back of the silver thread. Geijer proposed that the fabric used for headcoverings in the female burials represented some kind of cap, since traces of stitching were found on one or two fragments of cloth (Geijer 1938, 156).

The male caps were interpreted as a mitre-type because of their braid trimmings. Geijer also quotes the description by Ibn-Foszlān of Viking male dress in Russia, which includes a cap of gold brocade ('*goldstoffene*') trimmed with sable (Geijer 1938, 150).

Some evidence of twelfth-century women's dress from Masku, Finland, has survived (Purhonen *et al.* 1985, 35–47). This includes a headdress of similar rectangular shape and dimensions to the Dublin pieces but made of heavier wool twill cloth (Fig. 45). Although it has not been interpreted in this way it could also have been worn pinned at each side of the face with the fringes hanging down on the shoulders. It is an interesting parallel with the Hiberno-Norse material, even though in one interpretation the heavier weight of the Finnish cloth makes that headcovering stand up around the head like a hat. The Dublin scarves pinned and knotted in a similar fashion would produce a softer, draped appearance. Stylistically the Finnish headcovering may lie between the cap and the knotted scarf with features of both. Perhaps the Dublin pieces, using lighter, finer cloth, were variations in luxury fabrics of a workaday type of headdress widely known in other parts of Scandinavia. At present no directly comparable wool caps are known from these or other Viking Age sites.

Evidence from art and language

Illustrations of caps for men and women appear infrequently in Western European illuminated manuscripts of the period. The few images of women that do exist mostly show them with ample headdresses of the wimple type. Those women were often benefactors or saints, both then seen as enjoying high social status. Indeed, the monks who illuminated manuscripts may well have had a particular world view in which women, with a few exceptions, would tend to figure poorly.

It may be that the elaborate wimple-type headcoverings often illustrated were exclusive to wealthy ladies (Šroňková 1954, 21) and that women of lower social standing wore something much simpler, more like those from Dublin. Perhaps some wealthy women in other centres were following fashions different from those of their poorer contemporaries. Alternatively, the caps and scarves may be part of a style of dress other than that worn with the wimple. Rich female graves of the tenth century in Denmark contain examples both of traditional Scandinavian dress with paired oval brooches and, in a few very well-equipped graves, of possibly Byzantine-inspired fashion (Randsborg 1980, 129–31). The former could relate to cultures in Northern Europe relatively untouched by classical and Mediterranean fashions, whereas the development of the

fashion for the wimple and tunic was influenced by the court of Byzantium, inheritor of the classical tradition.

Frankish styles may represent another development from Byzantine and late Roman sources. It is thought that seventh-century Anglo-Saxon women changed from their ancestral dress to these fashions, including the wimple, as a consequence of their conversion to Christianity (Owen-Crocker 1986, 99).

In Ireland the evidence for women's dress for the early Christian period is drawn from illuminated manuscripts, metalwork and stone carvings. Nothing directly comparable to the Dublin caps has been recognised. High Crosses of the ninth and tenth centuries that are decorated with scriptural scenes include women among whom have been identified Mary the mother of Jesus, Elizabeth the mother of John the Baptist, and Anne the mother of Mary (Harbison 1992, vol. 3, fig. 813; vol. 3, fig. 784; vol. 2, fig. 243). Many of the figures are badly worn and difficult to interpret. The granite cross at Moone, Co. Kildare, portrays the story of the flight into Egypt of the Holy Family. However, the figure of Mary, depicted full face, does not show her hair (Harbison 1992, vol. 3, fig. 813).

The Durrow, Co. Offaly, sandstone cross clearly shows Elizabeth in profile wearing a knee-length tunic with a tablet-woven band at the lower edge, covered with a belted cloak, and carrying her baby on her back. Her hair is plaited at the side of her face. This plait would most likely have been one of two plaits starting at the nape of the neck, brought up each side of the face and fastened together to make a ring or crown of hair. It is easy to wear a cap, without ties but pinned in place, with this hairstyle.

At Clones, Co. Monaghan, and Monasterboice, Co. Louth, the Holy Family accepting the adoration of the Magi is depicted. The Clones composite cross shows Mary in full face with either thick hair falling to ear length or a full short headdress (Harbison 1992, vol. 2, fig. 128). At Monasterboice on Muiredach's Cross the seated figure of Mary has either hair or a headcovering that is shoulder length (Harbison 1992, vol. 3, fig. 805). A review of the female figures shown on the crosses does not suggest that voluminous head shawls of the wimple type were being worn.

The late thirteenth-century memorial stone from Kells Priory, Co. Kilkenny, already mentioned, shows a woman in a short headcovering but not a cap. It seems to be a cloth headwrapping held in place by a fillet, perhaps also of cloth (Hunt 1974, 181, fig. 15). It is not clear whether the adoption of Christianity influenced the way Irish women dressed.

In the context of Hiberno-Norse Dublin we should look at the way Scandinavian women were represented. Some images of women in Viking art indicate that their hair is plaited in a pigtail or tied in a knot. Small silver-gilt figures show this hairstyle clearly; in one example from Öland, Sweden (ninth–tenth centuries), a headband keeps back the hair (Pl. XV). These figures do not appear to be wearing caps. However, Walton, with reference to the York caps, drew attention to an eleventh-century wall-painting in the Cathedral of St Sophia, Kiev, in the Ukraine (Walton 1989, 376). A line drawing used in her illustration shows a woman wearing a tight-fitting cap, presumably tied under the chin. Although the painting of the neck is poor and somewhat blurred, there may be a lower part to the cap hanging down over the back of the neck.

The larger fresco shows four of the five daughters of Yaroslav, king of Kiev, richly dressed and carrying candles seemingly in procession (Pl. XVI). The other three princesses are also wearing variants of what may be wrapped headcoverings or caps; certainly none of them is wearing a wimple. They are wearing long, light-coloured dresses, in each case with slightly different overgarments very probably made from patterned silk. The painting appears to show more ample headcoverings than the Dublin caps.

The second woman in the procession, noted by Walton, is Elizabeth, who was married to Harald Haardraade of Norway (died AD 1066). He is known to have served in the Varangian Guard attached to the emperors of Byzantium and travelled between there and Scandinavia; he lost his life in England at the Battle of Stamford Bridge, York. Kiev was on the main Viking trading route to Byzantium and the Eastern Mediterranean (Jankuhn 1982, 37, 39) and we know this extended as far as—and indeed further than—the north of Britain and Ireland. It would be interesting if the painting did represent a royal person wearing a cap, since this would suggest that the fashion belonged to particular cultures rather than particular classes. Another interpretation is that the figures



Fig. 46. Man wearing cap, 'October', Fécamp Psalter, French, twelfth century AD.



Fig. 47. Hilka or flax headdress from North Dalecarlia, Sweden.



Fig. 48. Golden Madonna of Essen, German, late tenth century AD.

may have been male; this would establish the wearing of caps by both sexes (Achkasova and Totskova 1986, 66–77).

An early example of the linen caps so generally worn by men in the thirteenth century is shown in the Fécamp Psalter (Petzold 1995, 97) (Fig. 46). This dates from the last quarter of the twelfth century, and so is seemingly contemporary with the latest Dublin examples. The later caps as shown in the Psalter were cut and sewn to follow the curve of the head.

Walton also discusses a more recently worn headdress, the *hilka* or *flax* from North Dalecarlia, Sweden (Fig. 47). This is a rectangular piece of cloth, folded in half with ties at the lower edges. On some examples the back seams are not closed (Walton 1989, 376–7). These caps have an interesting similarity to the Viking Age headdresses.

From another northern context a late tenth-century statue in Essen, Germany, represents the Virgin Mary wearing a cap or wrapped headdress and a cloak pinned at the neck with an eagle brooch (illustrated in Bullough 1965, 308–9, fig. 21) (Fig. 48). This statue illustrates the point that people with the custom of wearing elaborate neck brooches would be less likely to wear headcoverings that would conceal such prestigious jewelry. Wimples would hide these ornate neck brooches so the inference may be drawn that the two were not worn together. A German ivory panel of the tenth century, illustrating the life of the Virgin Mary, shows her wearing a cap or wrapped headcovering that clearly does not cover her neck (Fig. 49).

The identification of clothing types worn by different social classes is also hindered by lack of evidence. However, a Byzantine Gospel of the eleventh century (Formaggio and Basso 1962, 11) depicts women in three different types of dress (Fig. 50). The scene shows the nativity of Christ and the annunciation to the shepherds, and also the empress of Byzantium as benefactress. She is shown in stiff hierarchical dress, the Virgin Mary in ample robes with flowing headcovering, and the two women believed to be midwives, who are washing the Child Jesus, in sleeveless straight gowns, their hair covered with tied scarves or caps. These last seem to be one of the few representations of working women at that time. Here may be the answer to the problem: there were different styles for each social class and also between cultures.

Linguistic evidence indicates that several types of headgear were current in early medieval Ireland and Anglo-Saxon England. In Irish several words are used. *Caille* (a veil) may well be an early Christian Latin borrowing. The Laws refer to 'a veil of a single colour and a diadem of gold', and in *Bethu Phátraic* 'the veil of baptism was white'. *Calla* and *calladh* are later forms of *caille*. The word was used in *The feast of Dun-nan-gebh* to denote a royal headcovering. *Meli* was in use before the ninth century and is translated in Cormac's *Glossary* (Y953) as *cop-cailli*. It also occurs in O'Clery's



Fig. 49. *Madonna and Child*, ivory plaque, German, tenth century AD (Hunt Museum, Limerick).

Glossary, where it is explained as 'veils or cloths on women's heads'. *Copp/coppa* may be rendered as 'crest, tuft, pointed headdress' and applies to both men and women. It is glossed as *breit*, being either 'a strip or band of cloth' or 'cloth, veil, coif'. In the *Táin bó Fraeich* a woman's headdress is *cenn-barr* (head-top), and in a gloss on the Brehon Laws it is *cenbar no caille* (headdress or head-veil). *Celbarr* can mean head-piece, helmet or caul. *Cennide* (headgear, headdress) is often used as a synonym for *cathbarr* (helmet). A term for male headgear is *att*, a straight borrowing during the Viking period of the Old Norse *hatt* meaning 'headcovering, hood or helmet' (Ó Corráin, pers. comm.;¹ Joyce 1903, 215–16). It can be seen that some of these terms could be related to the caps, scarves and bands found in Dublin. Caps from the thirteenth century on were known in France as *cale* (Andersson and Franzén 1975, 56).

Owen-Crocker, writing on Anglo-Saxon usage, has listed among others *caeppe/cappa* (cap, cape or hood), *hod* (hood), *feax-net* (hairnet), *cuffie* (cap, coif or hood), *hufe* (headcovering) (Icelandic *hufa* (hood, cap or bonnet)), *scyfel* (woman's headcovering, possibly shading the face), and *wimpel* (headdress, voluminous cloth concealing neck and head) (Owen Crocker 1986, 207–8). From this range of descriptive names it seems that there were many different headcoverings in England, perhaps not the impression given by contemporary illustrations.

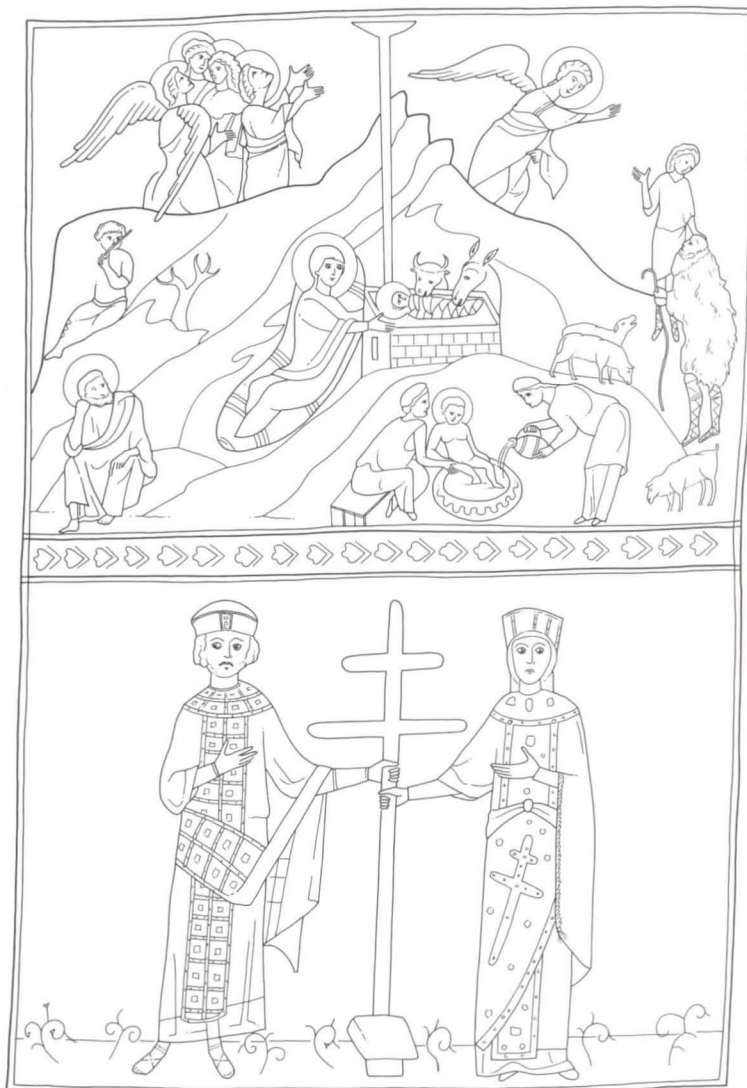
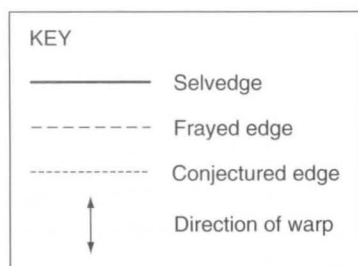


Fig. 50. *Nativity and Annunciation to shepherds with Constantine and St Helena*, Gospels, Byzantine, eleventh century AD (Palatina Library, Parma).

¹ Professor Donncha Ó Corráin (Department of History, University College, Cork) generously gave me the appropriate terms, translations and references for early Irish headcoverings.

Catalogue and diagrams of caps

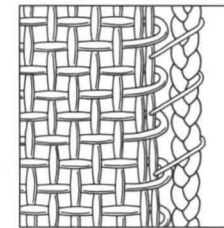
DHC30.	<i>CAP</i> Fishamble Street II E172:10241 (Pl. IX, Fig. 51) Above bedrock, bank 3, plot 1, level 8; late tenth century.	
Fibre:	Wool.	
Weave:	Tabby, open, balanced, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	Actual: 210mm × 170mm. Estimated original: 440mm × 180mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Loose
Yarn diameter:	0.24–0.25mm	0.18–0.21mm
Threads per cm:	14–16	15–17
Selvages:	One.	
Selvedge loops:	2mm, with pair of warp ends running through loops.	
Fringes:	None.	
Dye:	Analysis undertaken; traces of iron.	
Sewing:	Yes.	
DHC31.	<i>CAP</i> Fishamble Street II E172:10300 (not illustrated) Organic dump layer F98, plot 2, level 6; mid-/late tenth century.	
Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	Actual: A) 380mm × 160mm, B) 50mm × 50mm, C) 40mm × 40mm, D) 30mm × 20mm. Estimated original: 400mm × 160mm. Finished cap: 380mm × 160mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.19–0.21mm	0.21–0.23mm
Threads per cm:	14–20	15–16
Selvages:	Two.	
Selvedge loops:	2mm.	
Fringes:	Hems prevent checking.	
Dye:	No analysis.	
Sewing:	Yes.	



DHC30 CAP

Edging cord, 6 strand, Z-spun, 2(S)-ply x 3, plaited, 3mm diameter, black wool oversewn onto paired warp ends at selvedge.

Sewing thread Z-spun, 2(S)-plied, black wool, 0.9-1mm in diameter, same yarn as cord, 4 stitches per 10mm. All thread is woolly, not combed.



Not to scale

Paired warp ends same colour as cloth, 0.9mm in diameter.

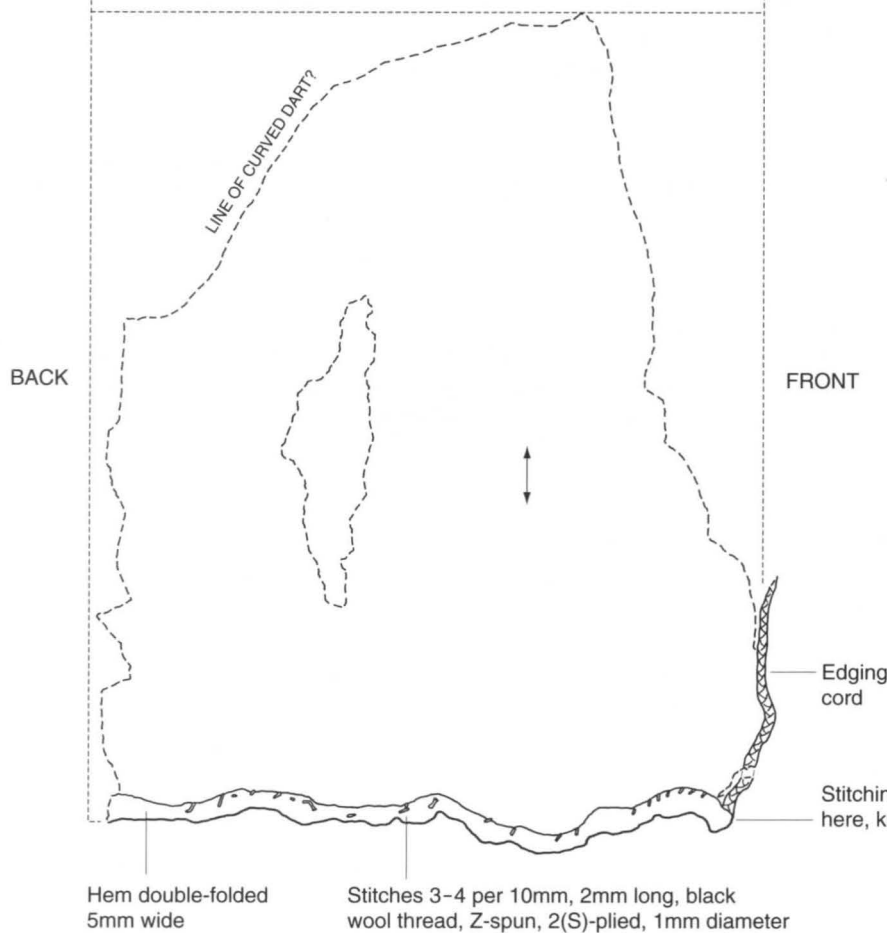


Fig. 51. DHC30 (E172:10241).

DHC32.	<i>CAP (AND PATCH)</i> Fishamble Street II E172:10540 (Pl. VII, Fig. 52)	
	Organic dump layer F98, plot 2, level 6; mid-/late tenth century.	
Fibre:	Cap A), Patch B), wool.	
Weave:	A) B) Tabby, open, regular.	
Colour:	Dark reddish brown, A) 5YR 2.5/1, B) 5YR 3/3.	
Condition:	A) B) Good.	
Dimensions:	A) Actual: 210mm × 150mm. Estimated original: c. 460mm × 180mm. B) 138mm × 80mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	A) B) Z	Z
Degree of spin:	A) B) Loose	Loose
Yarn diameter:	A) 0.22–0.25mm	0.17–0.21mm
	B) 0.21mm	0.17mm
Threads per cm:	A) 19–22	9–13
	B) 14–20	11–15
Selvages:	A) Two.	
Selvedge loops:	A) c. 1–2mm.	
Fringes:	A) B) Hemmed edges prevent checking.	
Dye:	A) B) No analysis.	
Sewing:	Yes.	
Comments:	Patch textile differs from cap. Hair caught in cloth; not identifiable as human.	
DHC33.	<i>CAP</i> Fishamble Street II E172:11205 (Pl. X, Fig. 53)	
	Organic sod layer, plot 2, level 2; early/mid-tenth century.	
Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Very dark brown 10YR 2/2.	
Condition:	Good.	
Dimensions:	Actual: 350mm × 170mm. Estimated original: (cloth piece) c. 490mm × 185mm. Finished cap: c. 450mm × 170mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.25–0.34mm	0.26–0.29mm
Threads per cm:	12–15	9–11
Selvages:	One, second one concealed under hem?	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes.	
Comments:	Hair caught in textile; not identifiable as human.	
DHC34.	<i>FRAGMENT OF CAP</i> Fishamble Street II E172:14499	
	(Fig. 54)	
	Context uncertain; date uncertain.	
Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Black 5YR 2.5/1.	
Condition:	Medium.	
Dimensions:	A) 120mm × 150mm (folded), 180mm × 120mm (unfolded). B) 45mm × 10mm. Estimated original: 380mm × 140mm. Finished cap (actual): 180mm × 120mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium/Loose	Loose
Yarn diameter:	0.23–0.25mm	0.19–0.23mm

DHC32 CAP

Thread used for back seam and patch is dark reddish brown wool as in folded hem.
All sewing thread Z-spun 2(S)-plied, c. 1mm in diameter. Unplied single yarn c. 0.5mm diameter. Thread is thicker and with less spin than cloth yarn

Hem double-folded, 10mm wide, 10-12 stitches in 60mm

Corner is out of true as if pulled by tie

Patch is stitched to inside of fabric with turned-under raw edge lying against outer fabric, slip stitched in place, 28 stitches in 138mm on edge nearest front of cap

Line of stitching to create curved dart to follow shape of head

Very narrow rolled hem down front edge turning under selvages, whip-stitched, 7 stitches per 10mm

BACK

Seam made by oversewing edges together

Hem, selvedge turned to inside to width of 25mm

FRONT

0 10cm

Fig. 52. DHC32 (E172:10540).

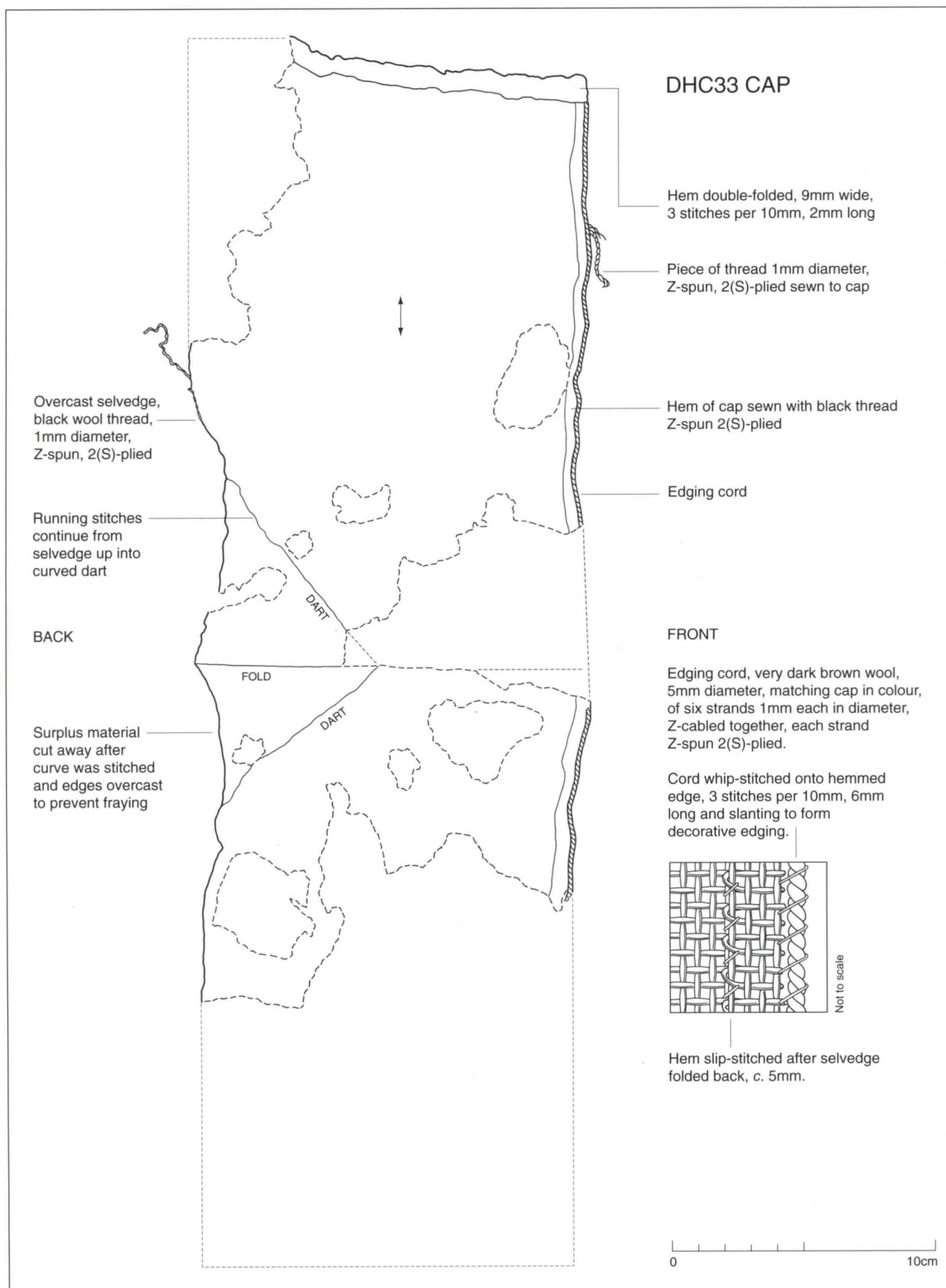


Fig. 53. DHC33 (E172:11205).

DHC35.

CAP Fishamble Street III E190:7431 (Fig. 55)

Under sod layer L1030, outside house FS 46, plot 9, level 7; mid-/late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Very dark brown 10YR 2/2.	
Condition:	Medium.	
Dimensions:	Actual: A) 230mm × 200mm, B) 100mm × 150mm. Estimated original (cloth piece): 460mm × 165mm. Finished cap: 220mm × 160mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Medium
Yarn diameter:	0.18–0.19mm	0.19–0.23mm
Threads per cm:	16–21	10–13
Selvedges:	Two.	
Selvedge loops:	1–2mm long.	
Fringes:	No.	
Dye:	Analysis undertaken; no dye detected.	
Sewing:	Yes.	

DHC36.

CAP John's Lane E173:4253 (Fig. 56)

Context uncertain; date uncertain.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 3/4.	
Condition:	Poor.	
Dimensions:	Actual: 240mm × 145mm. Estimated original: 480mm × 150mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Medium
Yarn diameter:	0.20–0.23	0.18–0.24
Threads per cm:	18–23	14–20
Selvedges:	Two.	
Selvedge loops:	3mm long.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes.	

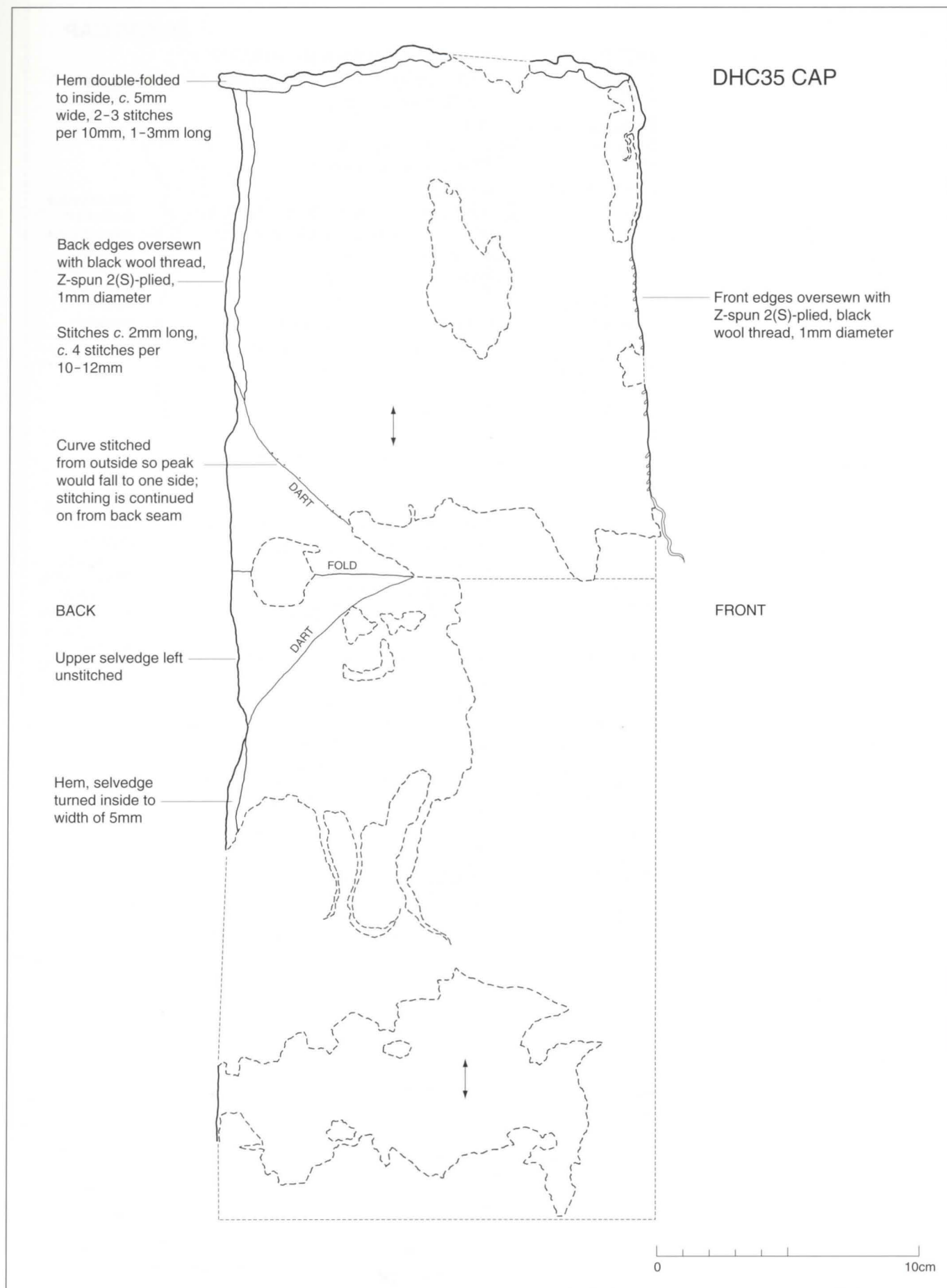


Fig. 55. DHC35 (E190:7431).

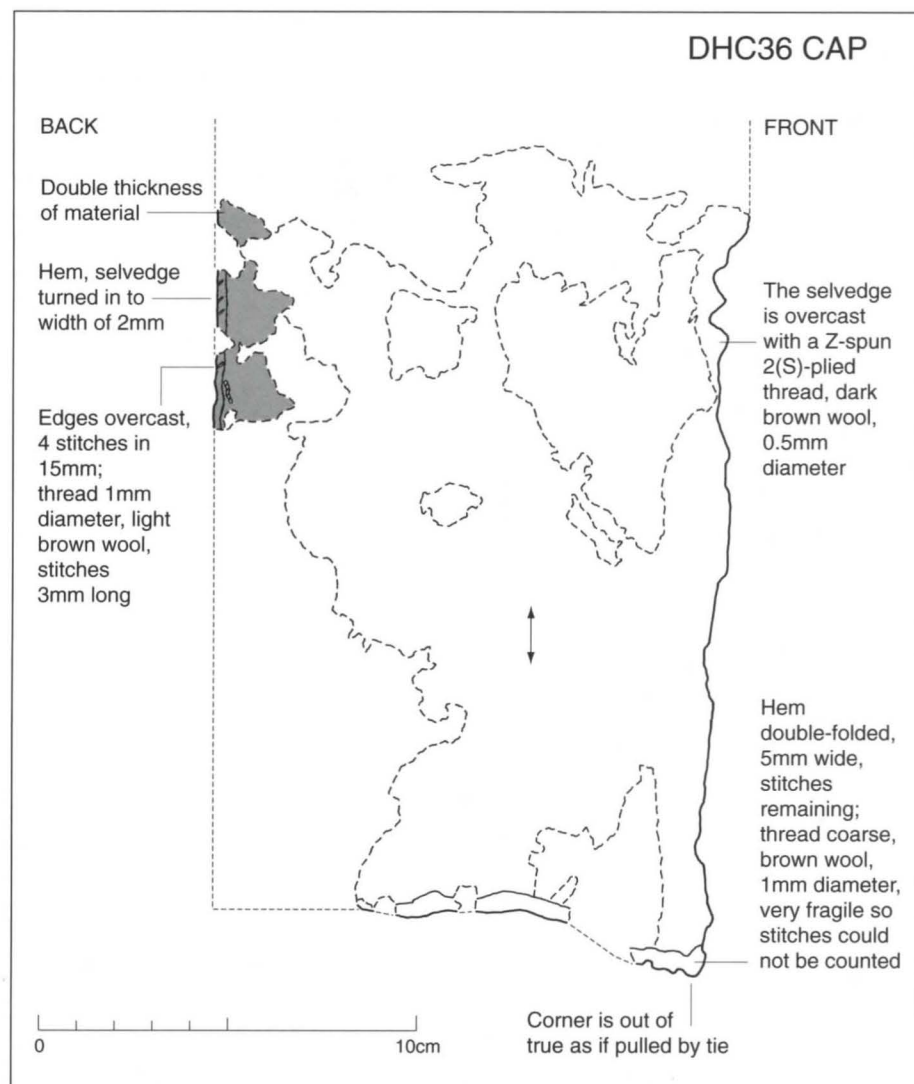


Fig. 56. DHC36 (E173:4253).

DHC37.

CAP Fishamble Street II E172:10959 (Pl. XI, Fig. 57)

Organic dump layer F134, west of house FS 20, plot 2, level 5; mid-/late tenth century.

Fibre:	Silk.	
Weave:	Tabby.	
Colour:	Light olive brown 2.5Y 5/4.	
Condition:	Medium.	
Dimensions:	Actual: A) 100mm × 170mm, B) 10mm × 68mm, C) 170mm × 170mm, D) 100mm × 170mm. Estimated original (cloth piece): 390mm × 178mm.	
Finished cap:	390mm × 170mm.	
	<i>Warp</i>	<i>Weft</i>
Twist direction:	Z	No twist
Degree of twist:	Loose	None
Yarn diameter:	0.12–0.17mm	0.30–0.32mm
Threads per cm:	19–21	22–27
Selvages:	One, 39 paired warp ends in 15mm band.	
Selvedge loops:	Not visible, selvedge is sewn into front edge of cap.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes.	
Comments:	Although cloth is not now sewn into a cap, the distinctive V-shaped curve marked out with stitch holes shows its original use.	

DHC37 CAP

Hem
double-folded,
2mm wide, stitch-holes,
no thread, edge is cut

Oversewing,
10 stitches per
20mm, 3mm long
but only 2mm
shows on front
of hem

Decorative intent
since most stitches
are on the outside
of cap, in contrast
to lower hem, where
hem-stitching is
visible on the inside

FRONT

A further length
of fabric may lie
between pieces
drawn

Selvedge both
hemmed and
oversewn
with dark brown
slightly Z-twisted
silk thread,
1mm diameter

Selvedge
39 paired warp
ends to a width
of 15mm

Hem
double-folded,
2mm wide, hem
stitches 7 per 20mm,
c. 1-2mm long,
thread 1mm
in diameter

Stitches barely
visible on outside,
visible and very
regular on inside

BACK

Stitch-holes
for curved
dart

DART

DART

A further
length of
fabric may
lie between
pieces
drawn

0 15cm

Fig. 57. DHC37 (E172:10959).

DHC38.

CAP? (WITH TWO PATCHES) (piece made up from five different types of silk) Fishamble Street II E172:12831 (Pl. XIII, Fig. 58)

House FS 22, plot 3, level 5; mid-/late tenth century.

Fibre: A) B) Dark yellowish brown 10YR 3/4. C) D) Dark brown 10YR 3/3. E) Silk.

Weave: A) B) C) D) E) Tabby, regular.

Colour: A) Olive brown 2.5Y 4/4.

B) Dark yellowish brown 10YR 3/4.

C) D) Dark brown 10YR 3/3.

E) Very dark greyish brown 10YR 3/2.

Condition: A) B) C) D) E) Good.

Dimensions: Actual: 210mm × 150mm. Cap? A) 145mm × 150mm, B) 70mm × 75mm, Patch C) 40mm × 30mm, Patch D) 40mm × 30mm, E) 45mm × 25mm.

Warp(?)

Weft(?)

Twist direction: A) B) C) D) Z

No twist

E) No twist

No twist

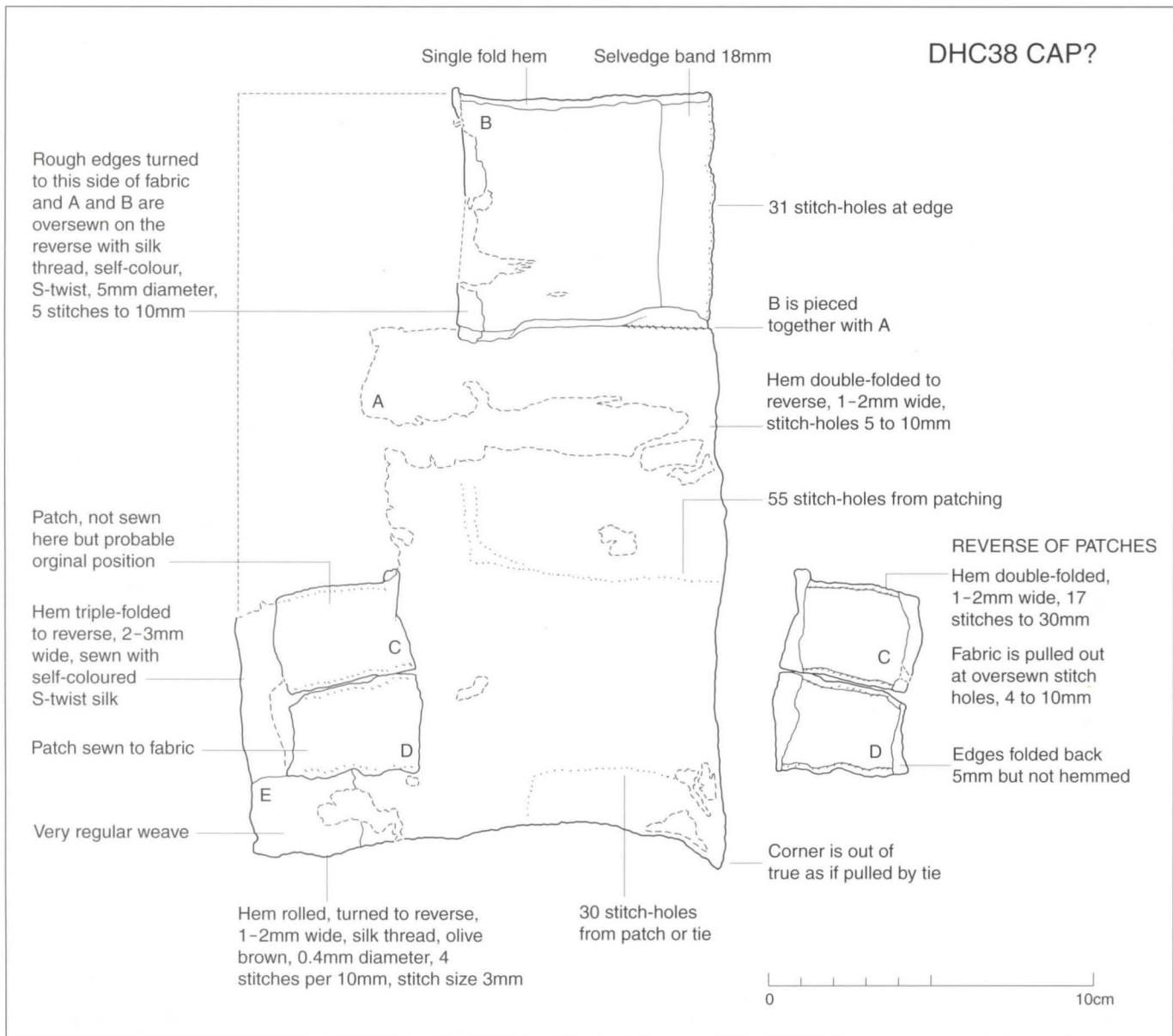


Fig. 58. DHC38 (E172:12831).

Degree of twist:	A) Loose/Medium B) C) D) Loose E) None	None None None
Yarn diameter:	A) System 1: 0.36–0.39mm B) Warp: 0.11–0.16mm C) System 1: 0.10mm D) System 1: c. 0.10mm E) System 1: c. 0.15mm	System 2: 0.22–0.24mm Weft: 0.33–0.39mm System 2: 0.18mm System 2: 0.18mm System 2: c. 0.25mm
Threads per cm:	A) System 1: 32–36 B) Warp: 23–29 C) System 1: 27–29 D) System 1: 28–30 E) System 1: 42	System 2: 21–24 Weft: 25–33 System 2: 40–49 System 2: 43–48 System 2: 22–26
Selvages:	B) One, band of closely set warps, same diameter as weft picks, c. 74 in 18mm.	
Selvedge loops:	No.	
Dye:	No analysis.	
Sewing:	Yes.	

DHC39.

CAP Fishamble Street II E172:13590 (Pl. XII, Fig. 59)
Dungy organic layer L1218 in house FS 16, plot 4, level 4; mid-tenth century.

Fibre:	Silk.	
Weave:	Tabby.	
Colour:	A) Dark yellowish brown 10YR 3/4. B) C) Dark yellowish brown 10YR 4/4.	
Condition:	Good.	
Dimensions:	Actual: A) 360mm × 155mm, Patch B) 45mm × 60mm, Patch C) 33mm × 50mm. Estimated original cloth size: 480mm × 168mm. Finished cap: 240mm × 155mm.	
	<i>Warp(?)</i>	<i>Weft(?)</i>
Twist direction:	A) System 1: Z B) Z C) System 1: Z	System 2: no twist No twist System 2: no twist
Degree of twist:	A) B) C) Loose	None
Yarn diameter:	A) System 1: 0.10–0.18mm B) 0.15mm C) System 1: 0.16mm	System 2: 0.38–0.50mm 0.45–1.00mm System 2: 0.62mm
Threads per cm:	A) System 1: 19–23 B) 20–25 C) System 1: 21–22	System 2: 19–27 21–22 System 2: 13–15
Selvedge:	B) One, reinforced selvedge 10mm wide, erratic warping: 23 × 2, 7 × 2, 1 × 4, 1 × 2, 1, 1 × 4, 10 × 2, 1 × 4.	
Selvedge loops:	None.	
Fringes:	None.	
Dye:	No analysis.	
Sewing:	Yes.	
Comments:	Composite piece of three types of silk.	

DHC40.

CAP (AND PATCH) Fishamble Street II E172:14370 (Pl. VIII, Fig. 60)

Organic layer L986, plot 6, level 2; early/mid-tenth century.

Fibre:	Silk.
Weave:	Tabby, open, regular.
Colour:	Dark reddish grey 5YR 4/2.
Condition:	Good.
Dimensions:	Actual: A) 530mm × 160mm, B) 135mm × 15mm, C) 60mm × 20mm, D) 50mm × 30mm. Patch E) 50mm × 30mm. Estimated original: 540mm × 160mm.

DHC39 CAP

BACK

FRONT

Curve is in running stitch, stitched from outside with same black wool thread, 4 stitches to 10mm

Hem double-folded, 3mm wide, no stitching remains, cut edge under hem

Both back edges are single-fold cloth, hem-stitched to finish raw edge back of cap above stitching for curve

Black wool thread, Z-spun, 2(S)-plied, 1mm diameter

Back edges are not stitched together

FOLD

0 10cm

Double patch on outer left-hand side of cap to strengthen tie area; creases still visible from tie

A: Cap, left hand front corner, tie area

B: Patch with selvedge

C: Second patch oversewn to first patch, double-folded hem c. 3mm, black wool thread, Z-spun, 2(S)-plied, 0.4mm in diameter

Patch oversewn with stitches 2mm long, 4 stitches per 10mm

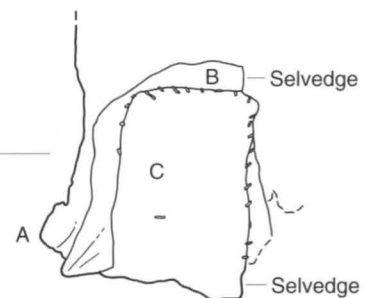


Fig. 59. DHC39 (E172:13590).

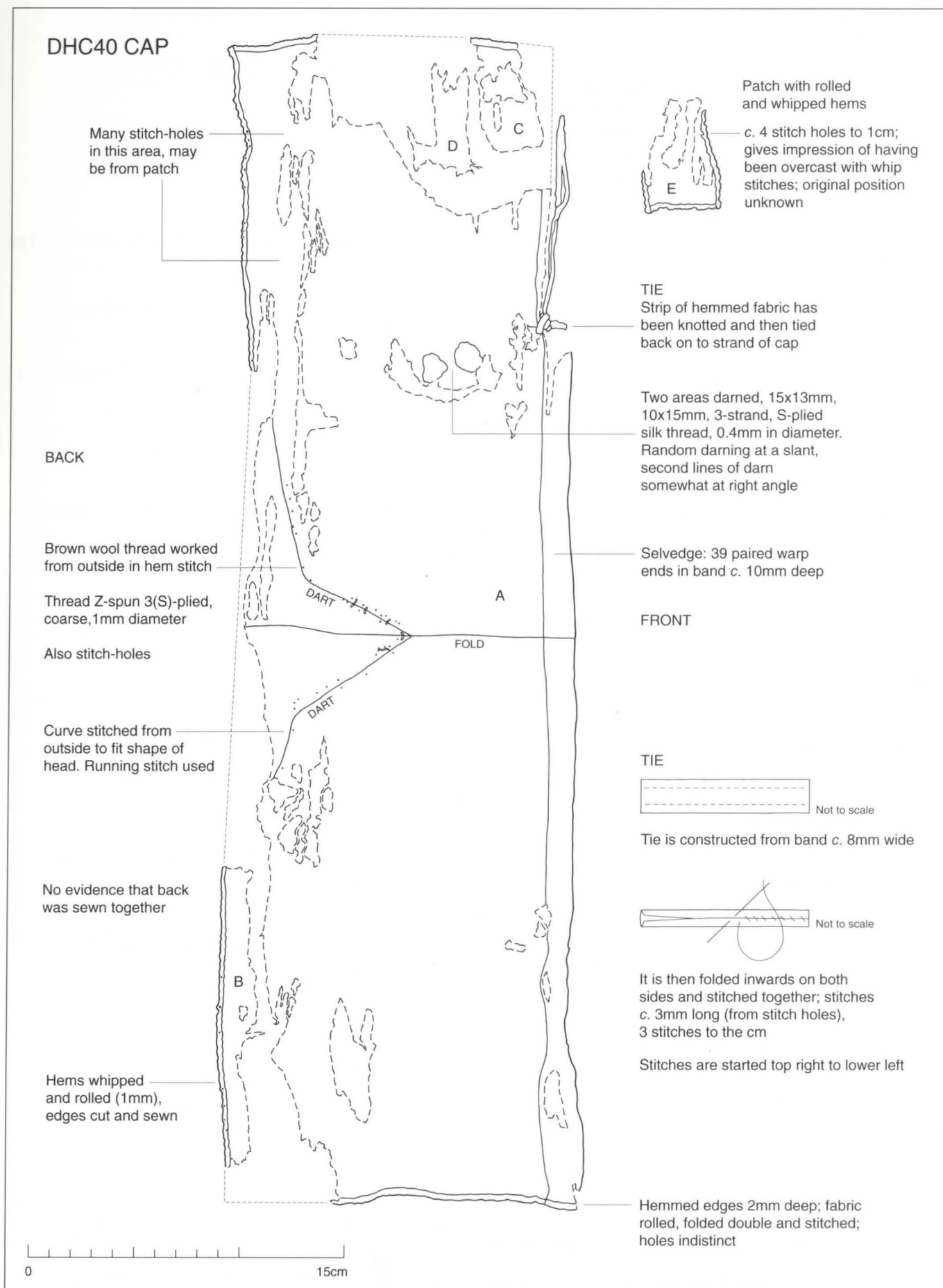


Fig. 60. DHC40 (E172:14370).

	<i>Warp</i>	<i>Weft</i>
Twist direction:	Z	Z
Degree of twist:	Loose	Loose
Yarn diameter:	0.13–0.16mm	0.14–0.15mm
Threads per cm:	30–34	19–25
Selvages:	One, selvedge band of 39 paired warps to depth of 14mm.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	Analysis undertaken; no dye detected.	
Sewing:	Yes. A strip of the main fabric has been reused to make a tie. The strip has been sewn into shape, knotted and tied back onto a strand of the paired warps of the selvedge.	
Comments:	Penny of Aethelstan (AD 924–40) associated with this piece, probably minted in Canterbury.	

DHC41. *CAP FRAGMENT?* Fishamble Street II E172:11066 (Fig. 61)
House FS 81, plot 3, level 10; early eleventh century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	Actual: A) 120mm × 50mm, B) 90mm × 50mm. Estimated original: 120mm × 130mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.26–0.29mm	0.24–0.26mm
Threads per cm:	14–16	8–9
Selvages:	One.	

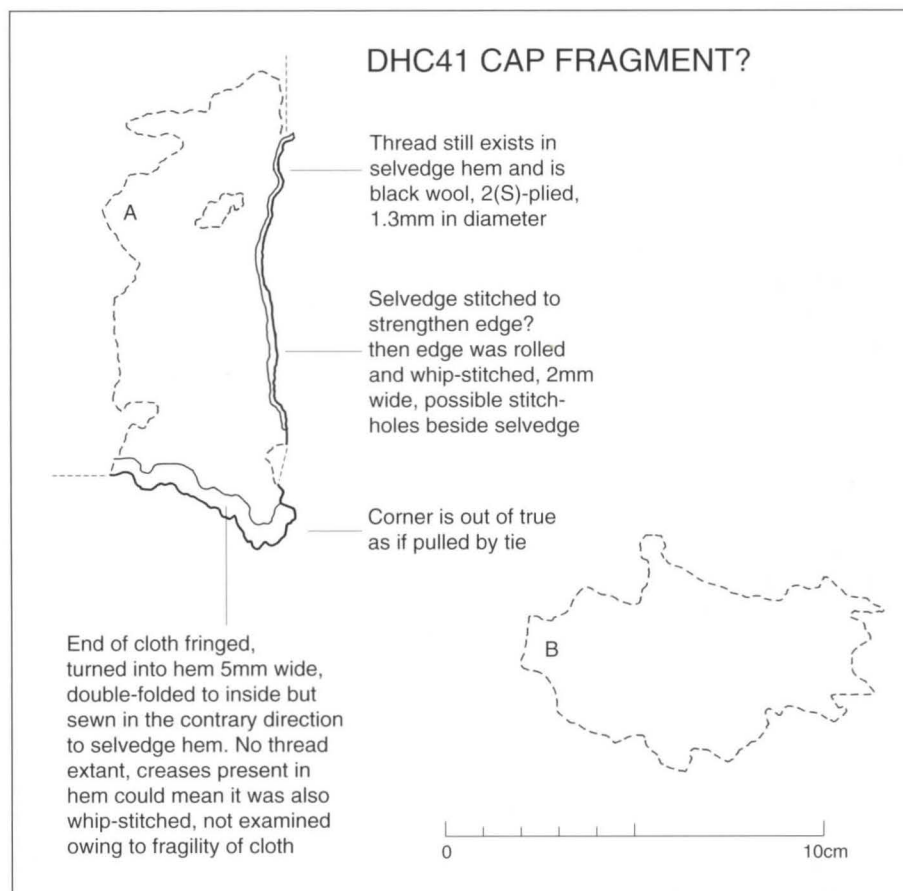


Fig. 61. DHC41 (E172:11066).

Selvedge loops: Stitching obscures selvedge.
 Fringes: One.
 Dye: No analysis.
 Sewing: Yes.

DHC42. *CAP FRAGMENT?* Fishamble Street II E172:13241 (Fig. 62)
 Organic layer L911 in house FS 26, plot 6, level 5; mid-/late
 tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	100mm × 48mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium/Loose (uneven twist)	Medium/Loose
Yarn diameter:	0.31–0.34mm	0.20–0.26mm
Threads per cm:	14–16	11–14
Selvedges:	One.	
Selvedge loops:	1mm long.	
Fringes:	No.	
Dye:	Analysis undertaken; traces of iron mordant.	
Sewing:	Yes.	

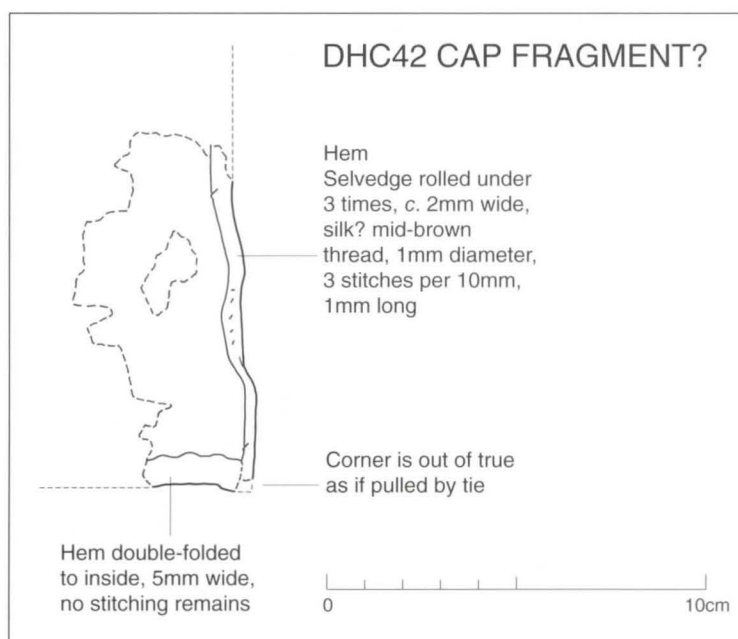


Fig. 62. DHC42 (E172:13241).

DHC43. *CAP/SCARF FRAGMENT (AND PATCH)* Fishamble Street II
 E172:11171 (Fig. 63)

Organic layer L458 in house FS 83, plot 4. level 10; early
 eleventh century.

Fibre:	Wool.
Weave:	Tabby, open, regular.
Colour:	Very dark brown 10YR 2/2.
Condition:	Very poor, many fragments.
Dimensions:	Actual: A) 260mm × 130mm, B) 70mm × 30mm, C) 105mm × 50mm, D) 110mm × 60mm, E) 80mm × 30mm, F) 110mm × 35mm, G) 90mm × 40mm, H) 240mm × 70mm, I) 50mm × 30mm, J) 50mm × 15mm, Patch K) 150mm × 55mm. Estimated original: (minimum) 500mm × 150mm.

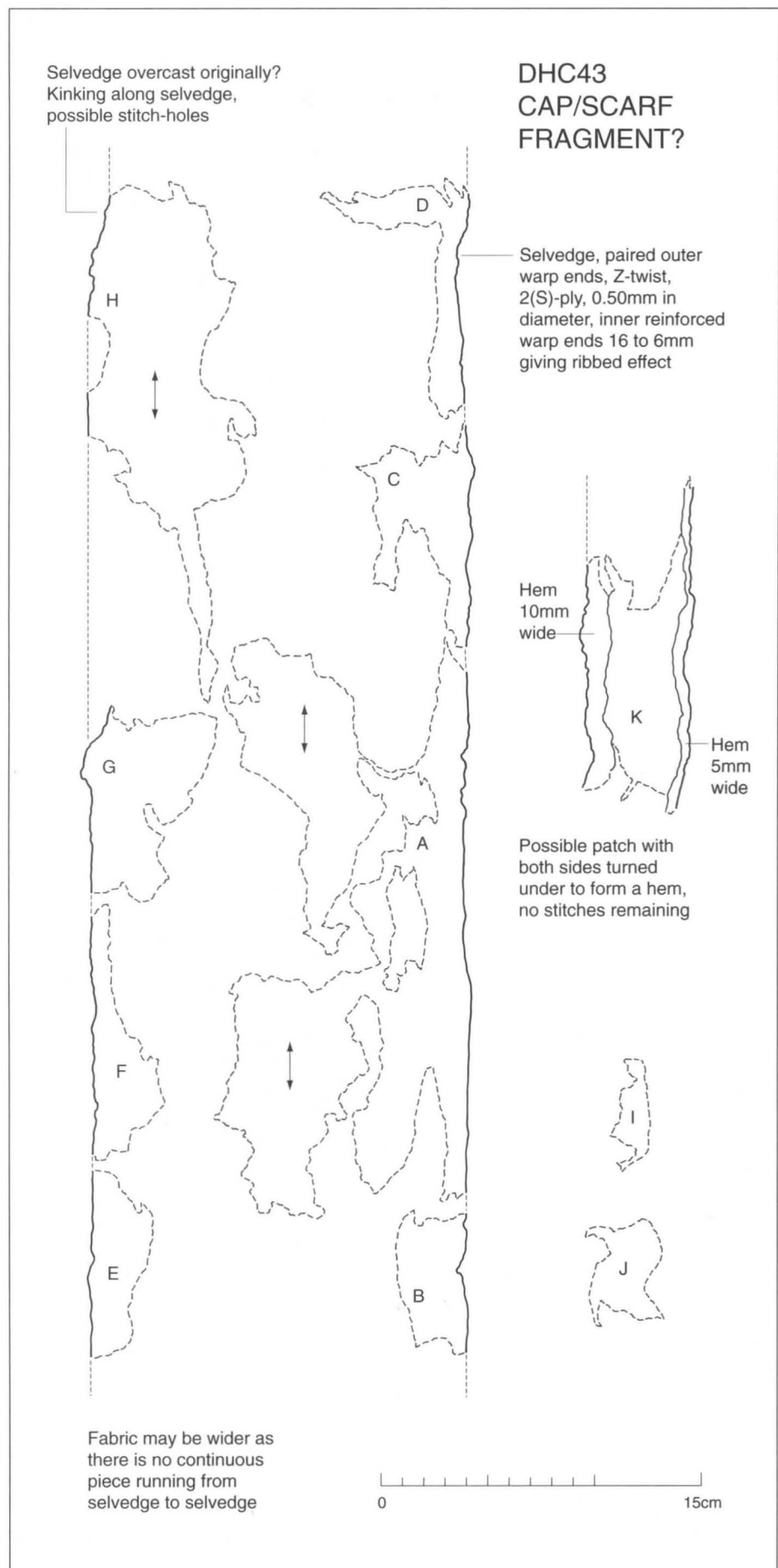


Fig. 63. DHC43 (E172:11171).

	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium/Loose	Medium
Yarn diameter:	0.24–0.26mm	0.24–0.27mm
Threads per cm:	12–14	9–12
Selvages:	Two? Reinforced band beside paired outer warp ends, 16 to 6mm, gives ribbed effect at selvedge.	
Selvedge loops:	No, because warp ends survive at selvedge.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Possible stitch-holes.	
Comments:	Human hairs caught in textile; may be either scarf or cap. Patch has same weave, spin and yarn measurements as main textile.	

DHC44. *CAP (FRAGMENT)* High Street E476:2926A (Fig. 64)
F553; mid-eleventh century.
Fibre: Wool.
Weave: Tabby, very open, regular.

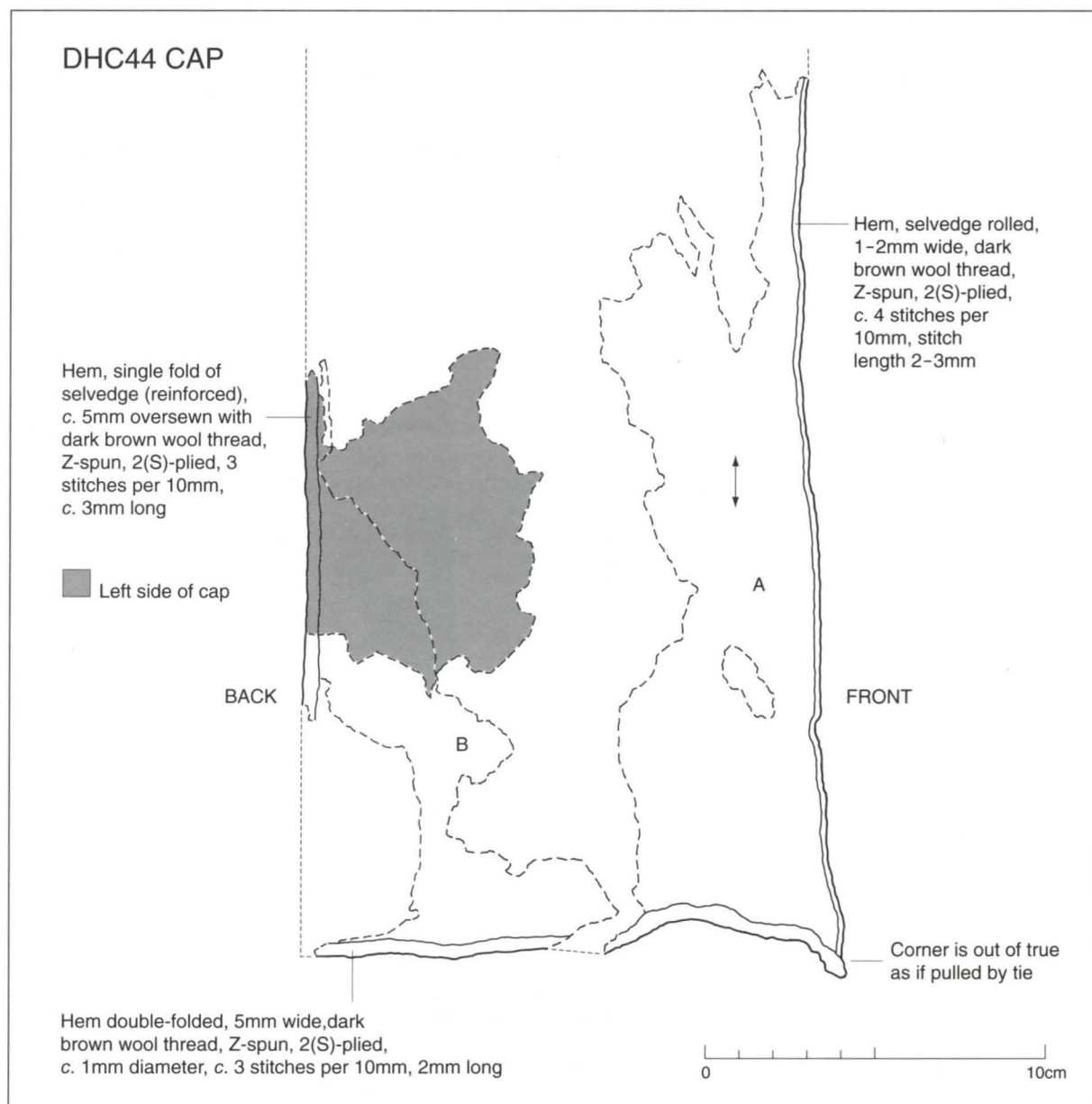


Fig. 64. DHC44 (E476:2926A).

Colour:	Dark brown 7.5YR 3/2.	
Condition:	Poor.	
Dimensions:	Actual: A) 276mm × 70mm, B) 160mm × 160mm. Estimated original: 520mm × 170mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Medium/Loose
Yarn diameter:	0.22–0.27mm	0.27–0.31mm
Threads per cm:	14–15	9–10
Selvages:	Two.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes.	

DHC45. *CAP (FRAGMENT)* High Street E476:2447 (Fig. 65) F388; mid-/late twelfth century.

Fibre:	Wool.	
Weave:	Tabby, fine, open, regular.	
Colour:	Black 5YR 2.5/1.	
Condition:	Poor.	
Dimensions:	Actual: 140mm × 100mm. Estimated original: 320mm (minimum) × 65mm (minimum).	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Medium
Yarn diameter:	0.23mm	0.30mm
Threads per cm:	c. 10	8–9
Selvages:	One.	

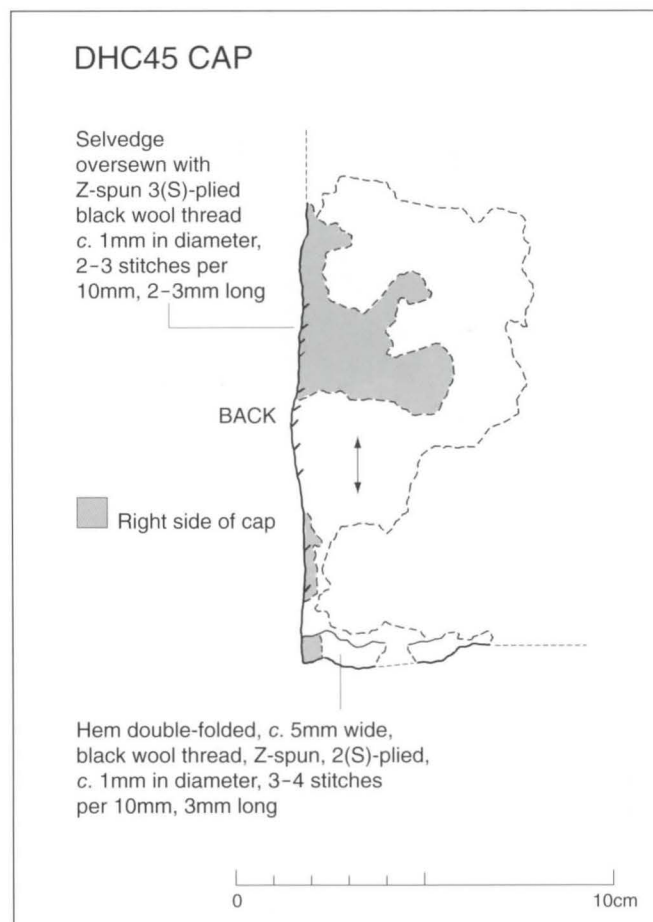


Fig. 65. DHC45 (E476:2447).

Selvedge loops:	No.
Fringes:	No.
Dye:	No analysis.
Sewing:	Yes.

Catalogue and diagrams of miscellaneous pieces

DHC46. *CLOTH (FRAGMENT)* Fishamble Street II E172:3393 (Fig. 66)
Layer L3 in house FS 65, plot 1, level 9; late tenth/early eleventh century.

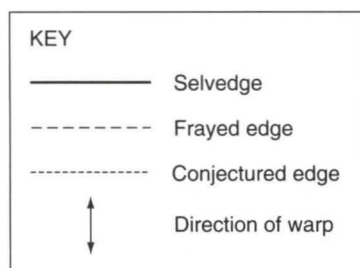
Fibre: Wool.
Weave: Tabby, open, regular and balanced.
Colour: Dark reddish brown 5YR 2.5/2.
Condition: Good.
Dimensions: 60mm × 255mm.
Warp *Weft*
Spin direction: Z Z
Degree of spin: Loose Loose
Yarn diameter: 0.20–0.24mm 0.23–0.26mm
Threads per cm: 14–17 13–16
Selvedges: One.
Selvedge loops: 2mm long.
Fringes: No.
Dye: No analysis.
Sewing: No.

DHC47. *CLOTH (FRAGMENT)* Fishamble Street II E172:8176 (Fig. 67)
Layer H106, plot 1, level 3; mid-tenth century.

Fibre: Silk.
Weave: Tabby.
Colour: Light olive brown 2.5Y 5/4.
Condition: Good.
Dimensions: 40mm × 250mm.
Warp *Weft*
Twist direction: Z None
Degree of twist: Loose None
Yarn diameter: 0.05–0.13mm 0.30–0.58mm
Threads per cm: 17–20 24–27
Selvedges: One, reinforced, at least 37 paired warps at 5mm, frequency of 7 pairs per mm (outer edge of selvedge frayed).
Selvedge loops: No.
Fringes: No.
Dye: No analysis.
Sewing: No.

DHC48. *CLOTH (FRAGMENT)* Fishamble Street II E172:10574 (Fig. 68)
Organic dump layer F98, plot 2, level 6; mid-/late tenth century.

Fibre: Wool.
Weave: Tabby, open, regular.
Colour: Very dark greyish brown 10YR 3/2.
Condition: Good.
Dimensions: 74mm × 44mm.
Warp *Weft*
Spin direction: Z Z



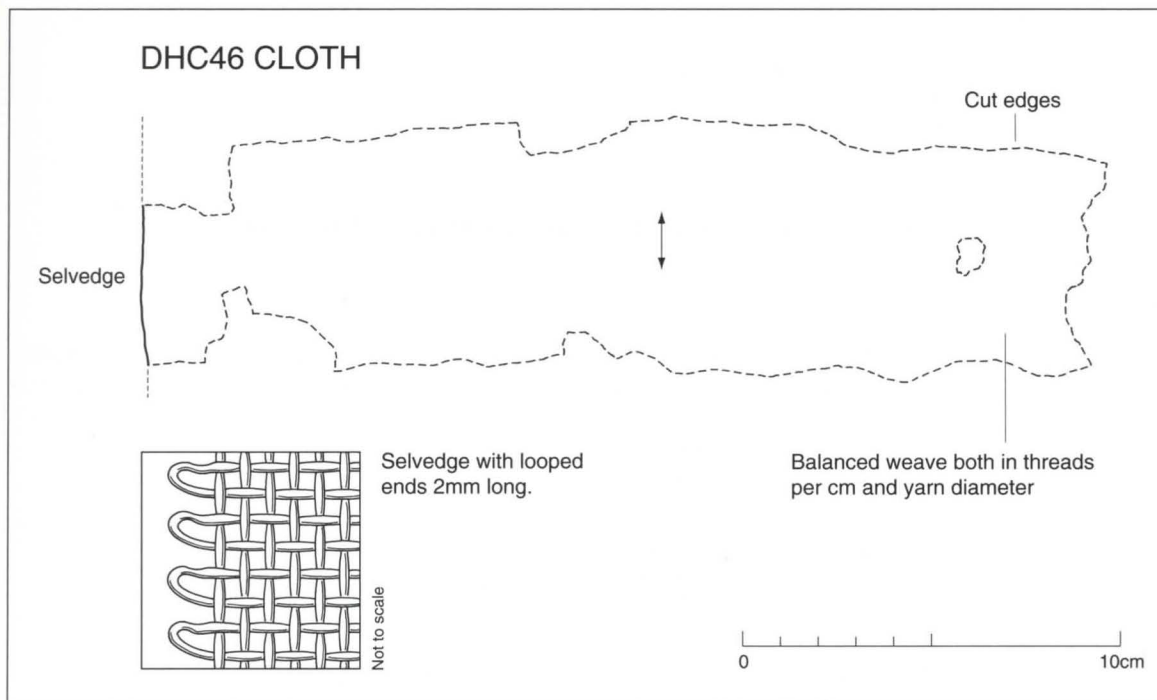


Fig. 66. DHC46 (E172:3393).

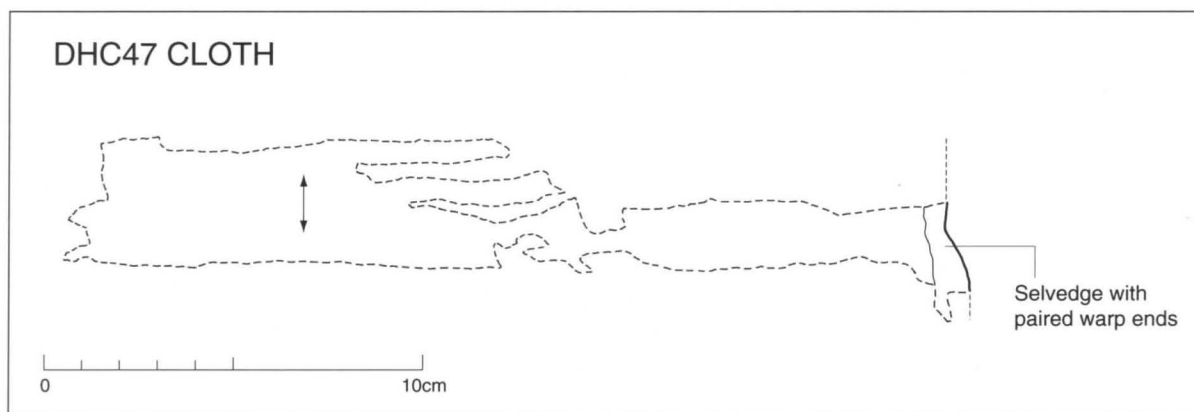


Fig. 67. DHC47 (E172:8176).

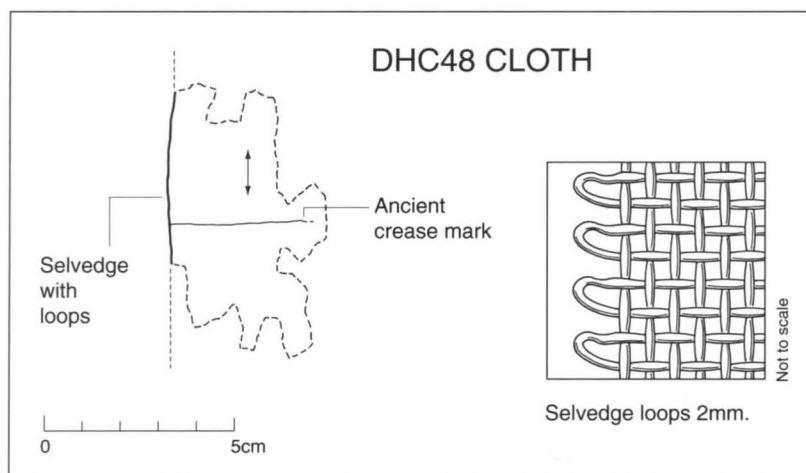


Fig. 68. DHC48 (E172:10574).

Degree of spin:	Loose	Medium
Yarn diameter:	0.21–0.26mm	0.32–0.34mm
Threads per cm:	18–20	15–16
Selvages:	One.	
Selvedge loops:	2mm long.	
Fringes:	No.	
Dye:	Analysis undertaken; ellagic acid present.	
Sewing:	No.	

DHC49.

CLOTH (FRAGMENTS) Fishamble Street II E172:11791
(Fig. 69)

Organic layer L488, open area west of house FS 51, plot 3, level 8; late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular, balanced.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Medium.	
Dimensions:	A) 135mm × 120mm, B) 90mm × 40mm, C) 80mm × 40mm.	
	<i>System 1</i>	<i>System 2</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.29–0.34mm	0.24–0.28mm
Threads per cm:	12–13	10–12
Selvages:	No.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	No.	

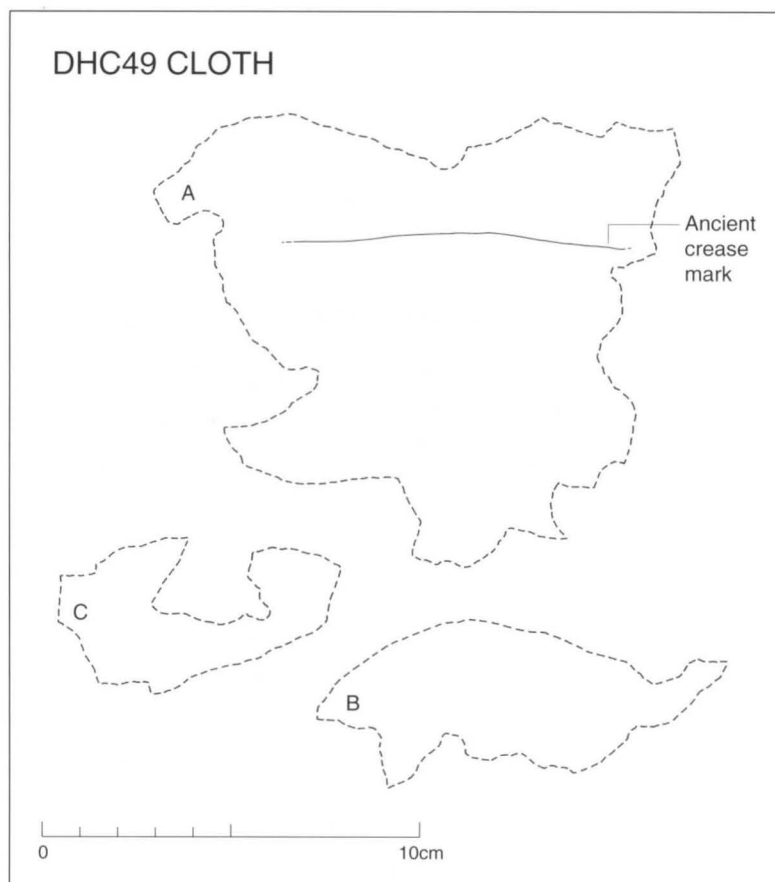


Fig. 69. DHC49 (E172:11791).

DHC50.

TWO CLOTH PIECES (KNOTTED) Fishamble Street II
E172:12695 (Fig. 70)

Culvert F869, plot 6, level 8; late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular, balanced.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	65mm × 50mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Medium
Yarn diameter:	0.25–0.28mm	0.21–0.25mm
Threads per cm:	15	15
Selvages:	Two, one on each piece.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	Analysis undertaken; no dye detected.	
Sewing:	No.	

Comments: These two pieces have the same specification. Of the small amount of cloth remaining three warp ends in each selvedge fragment are formed of two threads, as is one weft pick.

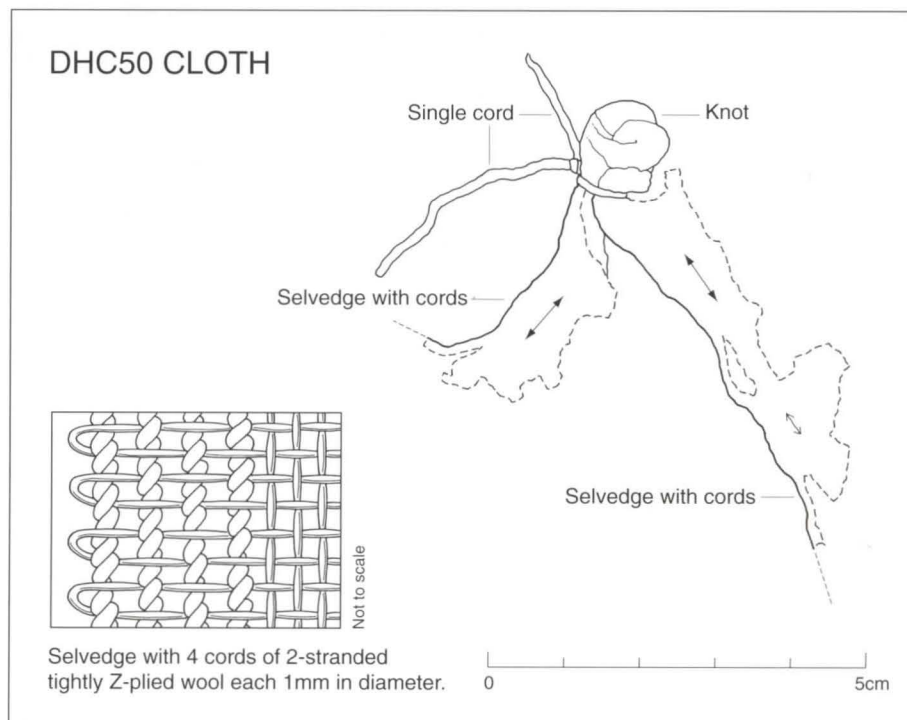


Fig. 70. DHC50 (E172:12695).

DHC51.

CLOTH WITH CORD Fishamble Street II E172:12921 (Fig. 71)

Organic layer L488, open area west of house FS 51, plot 3, level 8; late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark brown 7.5YR 3/2.	
Condition:	Good.	
Dimensions:	A) 65mm × 170mm, B) 170mm × 80mm. Estimated original: 230mm (minimum) × 160mm (minimum).	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Tight	Tight/Medium
Yarn diameter:	0.19–0.23mm	0.19–0.21mm

Threads per cm:	13–19	13–15
Selvages:	Two, one each on A) and B).	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes. A) consists of two separate pieces of fabric pieced together down the centre; the selvages were sewn together to make up one piece. Perhaps the outer edges of the cloth were sewn together to make a bag. B) may be a continuation of A) and has the same specifications.	

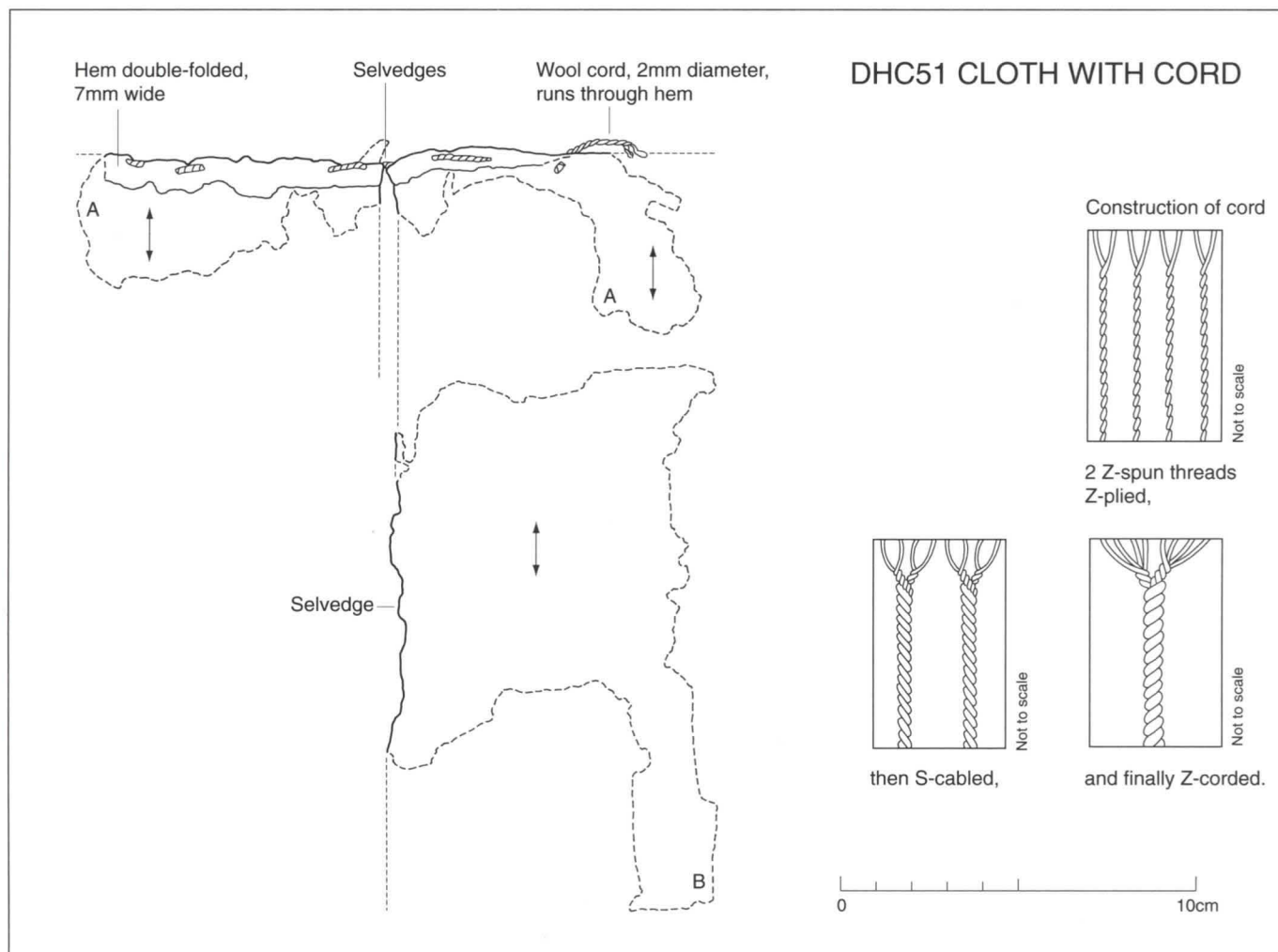


Fig. 71. DHC51 (E172:12921).

DHC52.

	<i>CLOTH (FRAGMENT)</i> Fishamble Street II E172:13125 (Fig. 72)	
	FSII 179, 14, organic layer L895, plot 6; late tenth century.	
Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Very dark greyish brown 10YR 3/2.	
Condition:	Good.	
Dimensions:	193mm × 100mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.22–0.23mm	0.18–0.25mm
Threads per cm:	15–18	11–13
Selvages:	One.	
Selvedge loops:	No.	

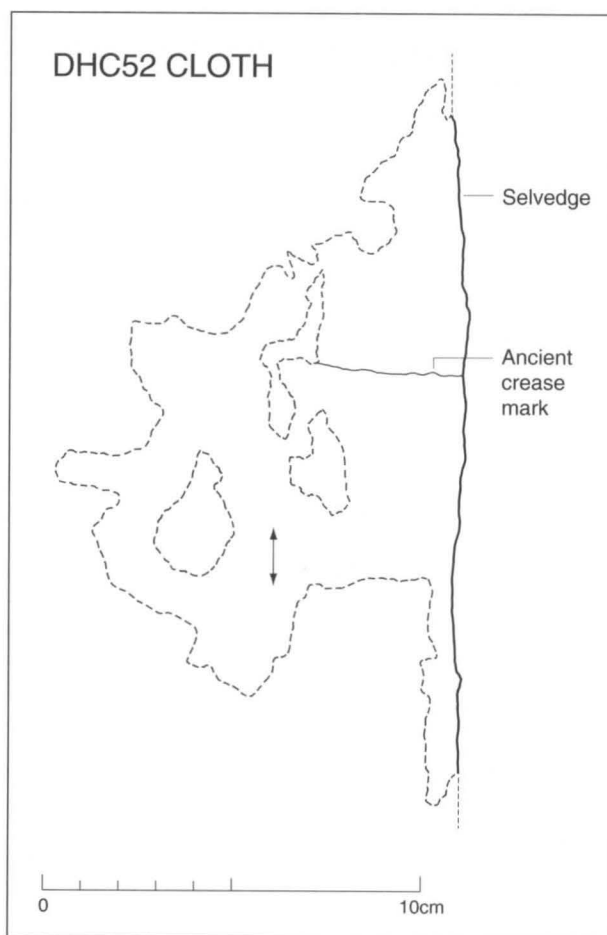


Fig. 72. DHC52 (E172:13125).

Fringes: No.
Dye: No analysis.
Sewing: No.

DHC53.

STITCHED CLOTH Fishamble Street II E172:13552 (Fig. 73)
Dungy organic layer L1218 in house FS 16, plot 4, level 4; mid-tenth century.

Fibre:	Wool.
Weave:	Tabby, open, regular.
Colour:	Dark reddish brown 5YR 2.5/2.
Condition:	Good.
Dimensions:	110mm × 30mm when unfolded.
	<i>Warp(?)</i> <i>Weft(?)</i>
Spin direction:	Z Z
Degree of spin:	Medium Medium
Yarn diameter:	System 1: 0.23–0.24mm System 2: 0.22–0.25mm
Threads per cm:	System 1: 15–20 System 2: 14–15
Selvages	No.
Selvedge loops:	No.
Fringes:	No.
Dye:	No analysis.
Sewing:	Yes.
Comments:	Human hairs caught in the textile, so it is possibly a headcovering.

Threads per cm:	13–19	13–15
Selvages:	Two, one each on A) and B).	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes. A) consists of two separate pieces of fabric pieced together down the centre; the selvages were sewn together to make up one piece. Perhaps the outer edges of the cloth were sewn together to make a bag. B) may be a continuation of A) and has the same specifications.	

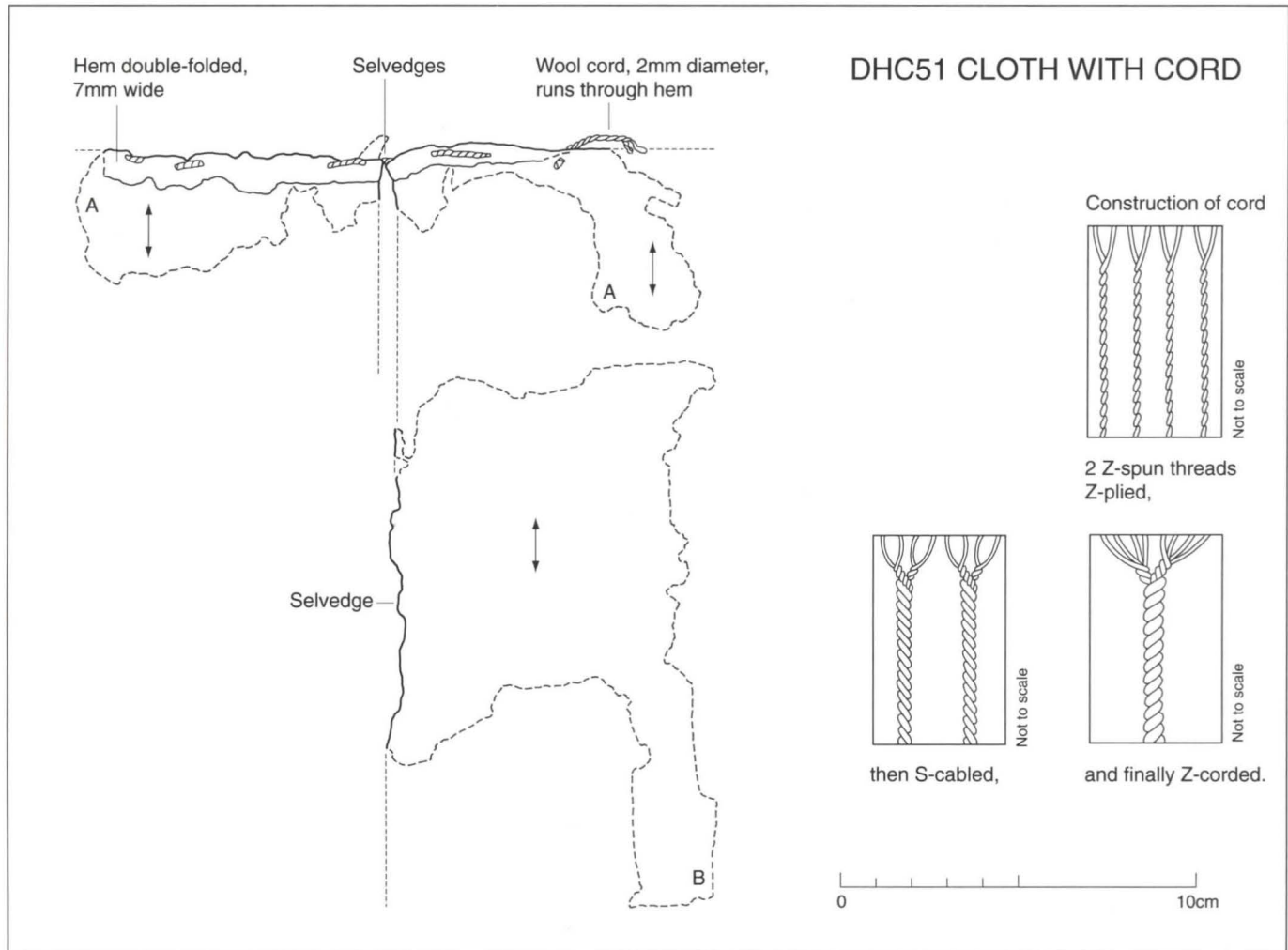


Fig. 71. DHC51 (E172:12921).

DHC52.

CLOTH (FRAGMENT) Fishamble Street II E172:13125 (Fig. 72)

FSII 179, 14, organic layer L895, plot 6; late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Very dark greyish brown 10YR 3/2.	
Condition:	Good.	
Dimensions:	193mm × 100mm.	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Loose	Loose
Yarn diameter:	0.22–0.23mm	0.18–0.25mm
Threads per cm:	15–18	11–13
Selvages:	One.	
Selvedge loops:	No.	

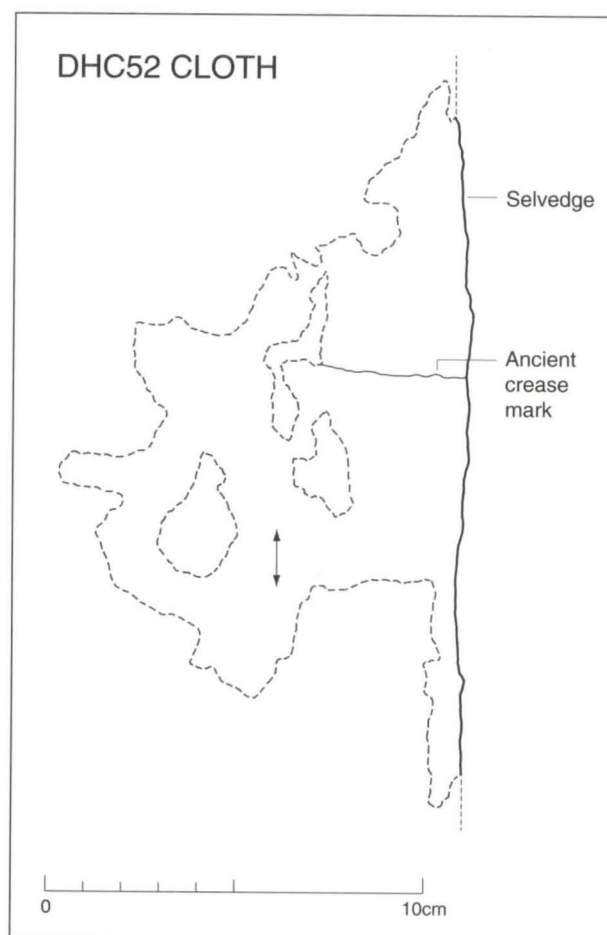


Fig. 72. DHC52 (E172:13125).

Fringes: No.
Dye: No analysis.
Sewing: No.

DHC53.

STITCHED CLOTH Fishamble Street II E172:13552 (Fig. 73)
Dungy organic layer L1218 in house FS 16, plot 4, level 4; mid-tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	110mm × 30mm when unfolded.	
	<i>Warp(?)</i>	<i>Weft(?)</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Medium
Yarn diameter:	System 1: 0.23–0.24mm	System 2: 0.22–0.25mm
Threads per cm:	System 1: 15–20	System 2: 14–15
Selvages	No.	
Selvage loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	Yes.	
Comments:	Human hairs caught in the textile, so it is possibly a headcovering.	

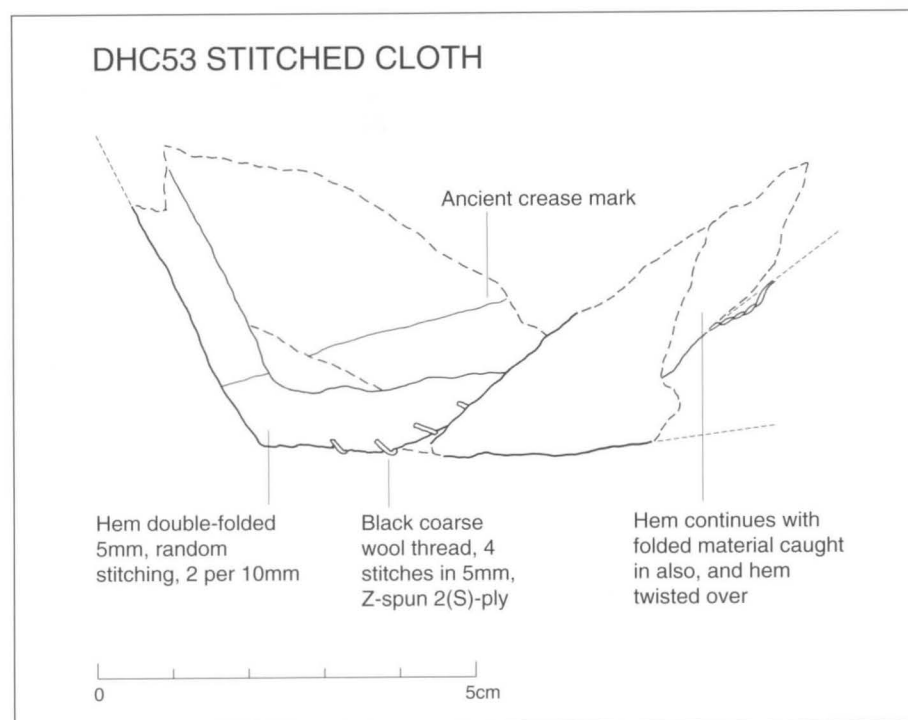


Fig. 73. DHC53 (E172:13552).

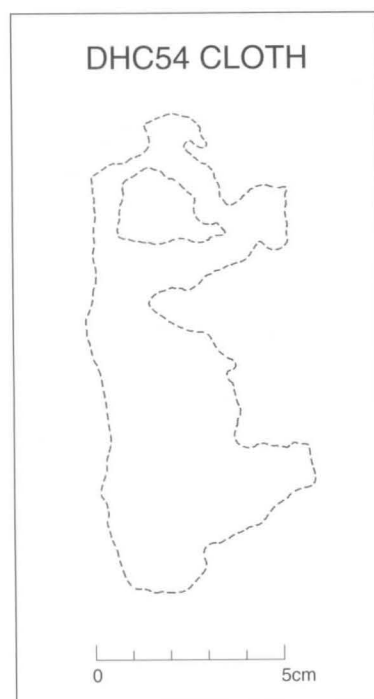


Fig. 74. DHC54 (E172:15223).

DHC54.

CLOTH Fishamble Street II E172:15223 (Fig. 74)
Open area F1253 west of house FS 10, plot 3, level 3; mid-tenth century.

Fibre:	Wool.
Weave:	Tabby, open, balanced.
Colour:	Dark reddish brown 5YR 2.5/2.
Condition:	Very poor, unreliable thread count.
Dimensions:	130mm × 58mm.
	Warp(?) Weft(?)
Spin direction:	Z Z
Degree of spin:	Loose/few Medium Loose
Yarn diameter:	System 1: 0.17–0.21mm System 2: 0.19–0.20mm
Threads per cm:	System 1: 10–13 System 2: 10–13
Selvages:	No.
Selvedge loops:	No.
Fringes:	No.
Dye:	No analysis.
Sewing:	No.
Comments:	Some kinks in yarn. Knot of thread Z-spun and S-plied separate from fabric, at least eight threads plied together. Knot 3mm, thread 6mm thick and 14mm long. Hair caught in textile; not identifiable as human.

DHC55.

CLOTH (FRAGMENTS) Fishamble Street III E190:7274 (Fig. 75)
Burnt organic layer L1001 in house FS 76, plot 9, level 9; late tenth/early eleventh century.

Fibre:	Wool.
Weave:	Tabby, open.
Colour:	Black 10YR 2/1.
Condition:	Poor.
Dimensions:	A) 120mm × 60mm, B) 40mm × 30mm, C) 60mm × 60mm.
	Warp Weft
Spin direction:	Z Z
Degree of spin:	Loose Loose

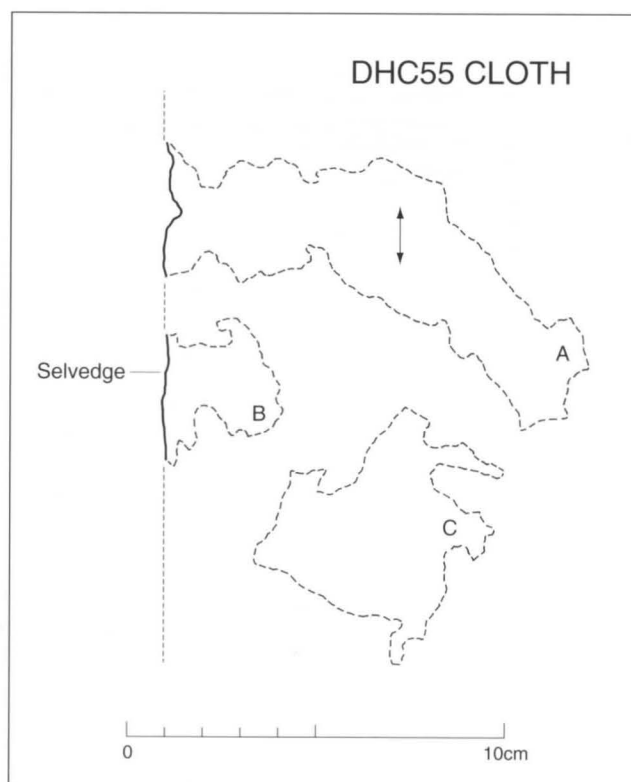


Fig. 75. DHC55 (E190:7274).

Yarn diameter:	0.22–0.23mm	0.22–0.23mm
Threads per cm:	12–16	11–15
Selvages:	Two, one each on A) and B).	
Selvedge loops:	c. 1.5mm long.	
Fringes:	No.	
Dye:	Analysis undertaken; iron mordant detected.	
Sewing:	No.	

DHC56.

STITCHED CLOTH Fishamble Street III E190:7495 (Fig. 76)
Under wattle screen F1042 in house FS 46, plot 9, level 7; mid-/late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Dark reddish brown 5YR 2.5/2.	
Condition:	Good.	
Dimensions:	Actual: A) 80mm × 150mm, B) 45mm × 120mm, C) 60mm × 50mm, D) 50mm × 10mm. Estimated original: 200mm × 160mm (minimum).	
	<i>Warp</i>	<i>Weft</i>
Spin direction:	Z	Z
Degree of spin:	Medium	Medium/Loose
Yarn diameter:	0.35–0.37mm	0.24–0.27mm
Threads per cm:	12–16	8–13
Selvages:	Three, two stitched together on A) and one on B).	
Selvedge loops:	Yes, with paired set of warp ends c. 1.5mm still running through loops at outer edge.	
Fringes:	No.	
Dye:	Analysis undertaken; traces of iron.	
Sewing:	Yes.	
Comments:	Hair caught in textile; not identifiable as human.	

Fig. 76. DHC56 (E190:7495).

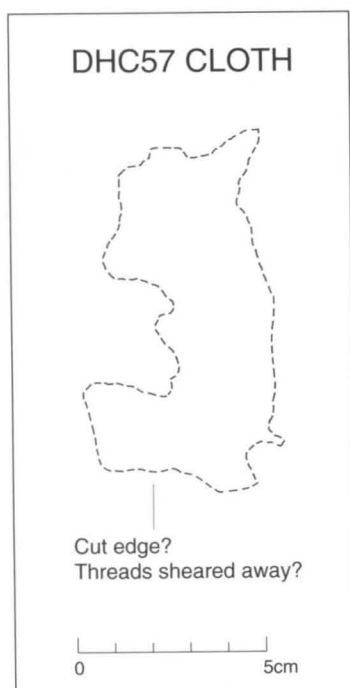
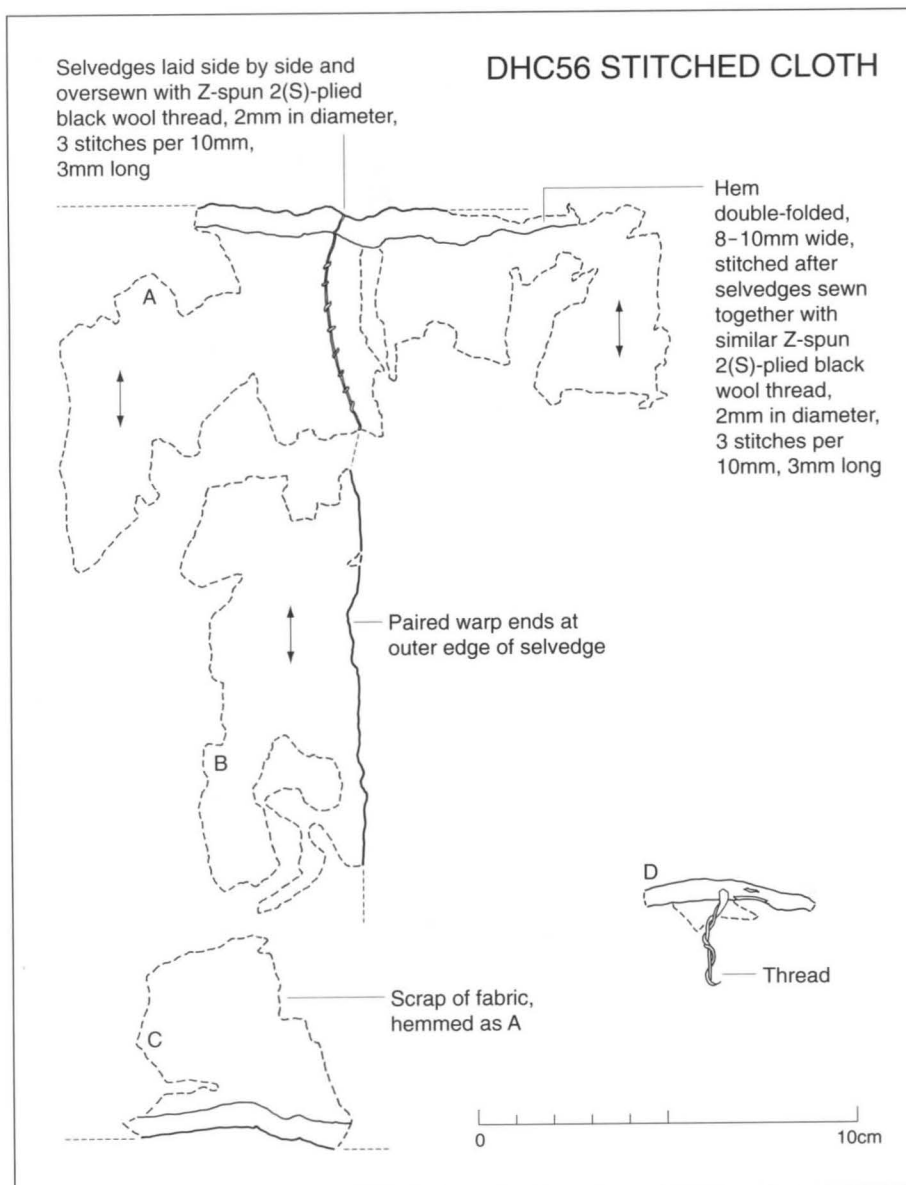


Fig. 77. DHC57 (E190:7593).

DHC57.

CLOTH Fishamble Street III E190:7593 (Fig. 77)
Mixed organic/sod layer L1600, plot 9, level 6; mid-/late tenth century.

Fibre:	Wool.	
Weave:	Tabby, open, regular.	
Colour:	Black 10YR 2/1.	
Condition:	Poor.	
Dimensions:	100mm × 40mm.	
	Warp(?)	Weft(?)
Spin direction:	Z	Z
Degree of spin:	Medium/Loose	Medium/Loose
Yarn diameter:	System 1: 0.18–0.21mm	System 2: 0.17–0.23mm
Threads per cm:	System 1: 15–18	System 2: 13–15
Selvedges:	No.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	Analysis undertaken; no dye detected.	
Sewing:	No.	
Comments:	Hair caught in textile; not identifiable as human.	

DHC58.*CLOTH* Fishamble Street II E172:9695 (Fig. 78)

Mixed organic layer L263, open area west of house FS 92, plot 3, level 11; early/mid-eleventh century.

Fibre: Silk.
Weave: Tabby.
Colour: Brown 10YR 4/3.
Condition: Good.
Dimensions: 190mm × 270mm.

	System 1	System 2
Twist direction:	Z + S-ply	None
Degree of twist:	Medium	None
Yarn diameter:	0.15–0.19mm	0.10–0.45mm
Threads per cm:	24–31	26–32
Selvedges:	No.	
Selvedge loops:	No.	
Fringes:	No.	
Dye:	No analysis.	
Sewing:	No.	
Comments:	Some System 1 threads are Z-twisted, some are two threads S-ply together. System 2 threads are knotted in at least thirteen places; this may be deliberate or result from a weaving fault. There are irregularities in yarn quality. Hair caught in textile; not identifiable as human.	

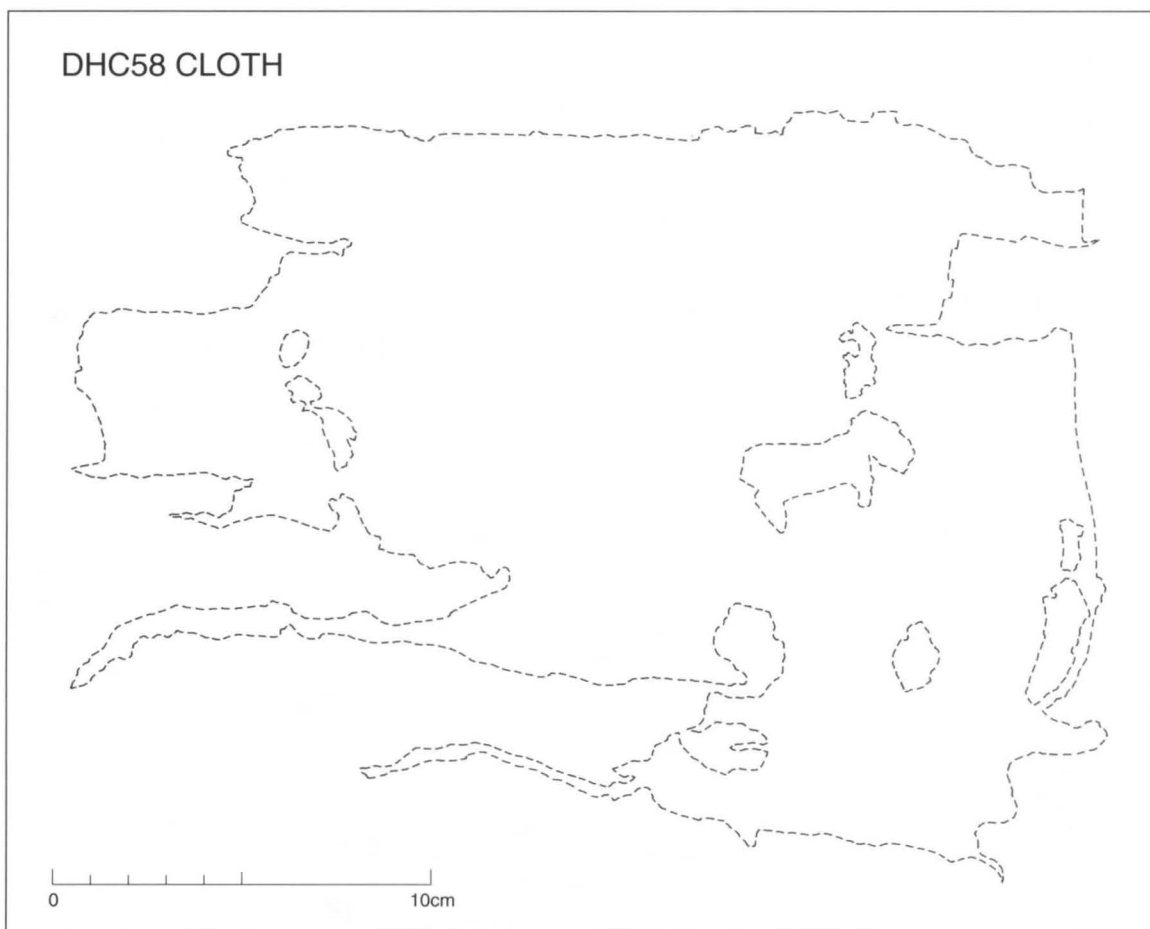


Fig. 78. DHC58 (E172:9695).

DHC59 STITCHED CLOTH (Underside of cloth)

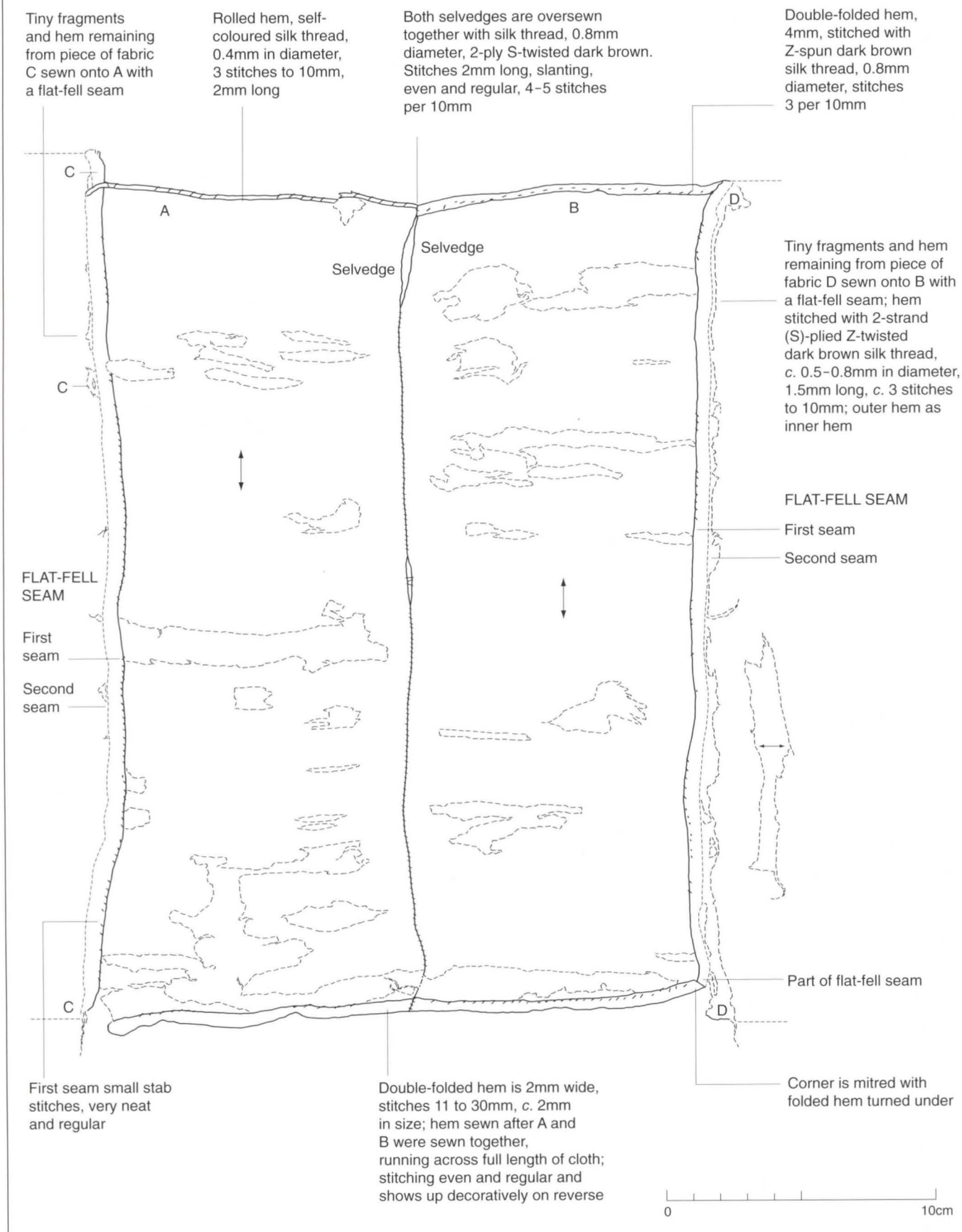
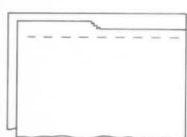
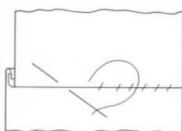


Fig. 79. DHC59 (E172:11780).

DHC 59 DETAILS OF SEWING

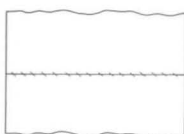


1: Two pieces of cloth placed right sides together. They are sewn together, then the inside of the seam cut away.

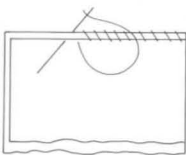


2: Edges double-folded down and secured by hemming.

Pieces D and A joined at left-hand side
Pieces B and C joined at right-hand side

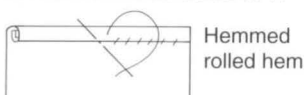


3: Cloth then opened out flat and used as one piece.

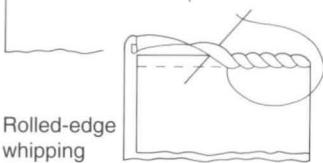


Pieces A and B are joined in the centre by oversewing selvages.

UPPER LEFT-HAND EDGE OF A

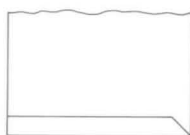


Rolled-edge whipping



Stitching on rolled hem is part whipstitching and part hemming.

LOWER RIGHT-HAND CORNER OF B



Folded hem corner neatly mitred, i.e. turned under at an acute angle.

DHC59.

Fibre:

Weave:

Colour:

Condition:

Dimensions:

Twist direction:

Degree of twist:

Yarn diameter:

Threads per cm:

Selvages:

Selvage loops:

Fringes:

Dye:

Sewing:

Comments:

STITCHED CLOTH Fishamble Street II E172:11780 (Pl. XIV, Fig. 79)

North aisle of house FS 69, plot 3, level 9; late tenth/early eleventh century.

Silk.

Tabby, regular.

Dark reddish brown 2.5YR 2.5/4

Good

305mm × 210mm, A) 305mm × 105mm, B) 305mm × 105mm.

Warp

Weft

A), B) Z

A), B) No twist

A), B) Medium

A), B) None

A), B) 0.12–0.15mm

A), B) 0.17–0.25mm

A) 28–30

A) 26–28

B) 29–33

B) 28–31

A) One. B) One, selvages consist of paired warp ends lightly Z-twisted. There are 40 paired warp ends to a width of 10mm.

No.

No.

No analysis.

Yes. Two pieces A) and B) of the same cloth sewn together. They seem identical and may be one long narrow strip cut and pieced together.

A double weft occurs randomly in weave.

DHC60.

Fibre:

Weave:

Colour:

Condition:

Dimensions:

Twist direction

Degree of twist:

Yarn diameter:

Threads per cm:

Selvages:

Selvage loops:

Fringes:

Dye:

Sewing:

Comments:

CLOTH Fishamble Street III E190:19536 (Fig. 80)

Organic layer L633 in house FS 90, plot 11, level 10; early eleventh century.

Silk.

Tabby.

Brown 10YR 4/3.

Good.

125mm × 140mm.

System 1

System 2

Z

No twist

Loose

None

0.09–0.15mm

0.16–0.21mm

32–37

41–50

No.

No.

Starting or finishing loops 10mm deep, twisted and grouped into five pairs.

No analysis.

No.

Hair caught in textile; not identifiable as human.

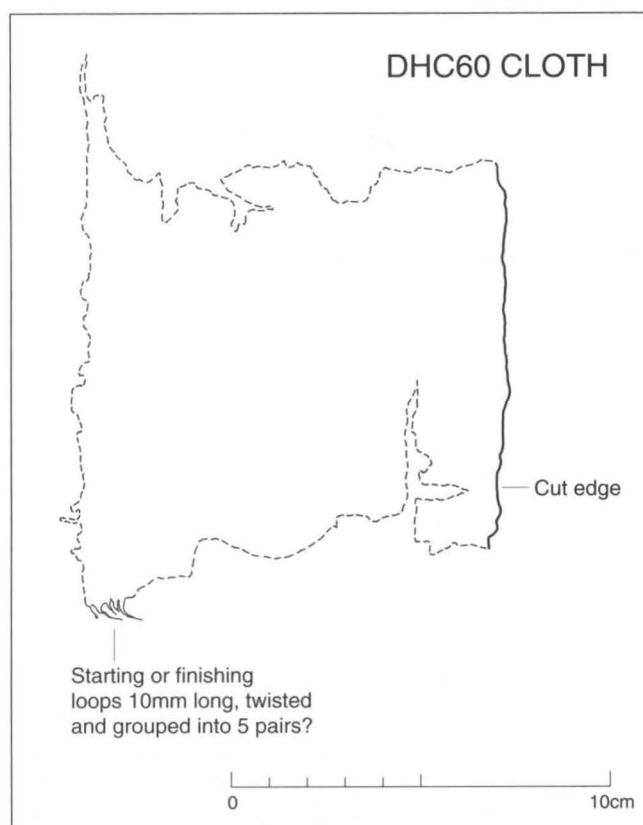


Fig. 80. DHC60 (E190:19536).

DHC61.

CLOTH Fishamble Street III E190:4406 (Fig. 81)

Sod layer L934 in house FS 97, plot 9, level 11; early/mid-eleventh century.

Fibre: Silk.
Weave: Tabby.
Colour: Dark brown 10YR 3/3.
Condition: Poor.
Dimensions: A) 70mm × 45mm, B) 70mm × 17mm.

	<i>System 1</i>	<i>System 2</i>
Twist direction:	None	None
Degree of twist:	None	None
Yarn diameter:	0.13–0.17mm	0.15–0.18mm
Threads per cm:	48–58	11–14

Selvedges: No.
Selvedge loops: No.
Fringes: No.
Dye: No analysis.
Sewing: No.

Comments: Piece is badly distorted. System 1 threads bunched together in places, in others widely separated. Thread densities per centimetre unreliable.

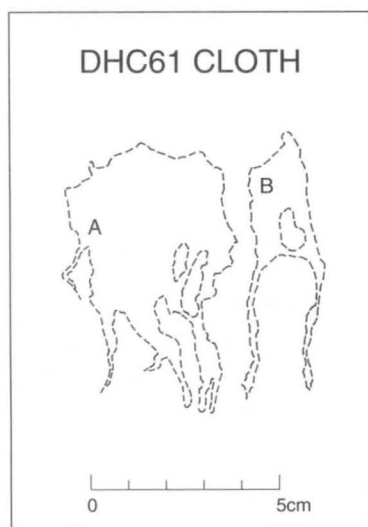


Fig. 81. DHC61 (E190:4406).

Cloth technology

Wool cloth

Cloth type, yarn, weave and dimensions (Tables 5, 6 and 7)

Spinning

The 40 wool textiles were all woven from combed yarn with a firm Z/Z spin. Before spinning, the fibres were combed so that they lay parallel, and the yarn was made from a long stapled wool of good quality. It would probably have been spun with a lightweight spindle whorl to achieve its thin, fine character. (The diameters of the threads cluster around 0.20mm.) For example, a light wood spindle with a carved cylindrical whorl as an integral part of it (E81:2463) from the Winetavern Street, Dublin, excavations (National Museum of Ireland 1980, 46 no. 224; Lang 1988, 54–5) seems suitable for this type of spinning. The spindle and whorl date from the eleventh–twelfth centuries. Very direct evidence comes from fine combed Z-spun wool yarn that has survived wound onto part of a wood spindle (E172:12212) (Pritchard 1992, 93). The yarn is *c.* 0.35mm in diameter, medium to tight spin. There are two light copper-alloy spindles (E172:4681, E172:2508). Also from Dublin, a small, almost square piece of wood has had fine Z-spun wool thread wound around it, diameter 0.28mm, loose spin (E141:3332) (Fig. 82). The fact that yarn similar to that used for the woven cloth exists on the site must be taken as strong evidence for local production.

Weaving

The weave is a regular, open and lightweight fine tabby. The open texture of the cloth has been achieved by leaving spaces between the threads in each system. The spacing is well-regulated and even. This feature of the construction means that the numbers of threads per centimetre taken on their own do not give an accurate account of the weave. To give a true picture of the light and airy nature of the cloth, the figures for yarn diameters must be taken in conjunction with those for the number of threads per centimetre. The average density of threads to the centimetre is sixteen for the warp systems and thirteen for the weft. It can be seen therefore that a fine soft wool cloth suitable for folding and draping was produced.

Sixteen pieces are most likely between 140mm and 180mm wide; twelve of them retain both selvages. The worked and finished lengths are between 380mm and 490mm (Fig. 83). Two bands, 120mm and 85mm wide, have both selvages. The particular weave used here is very balanced in the diameters of warp and weft yarn, the degree of spin and the density of threads. The cloth was not fulled.

Although Z/Z-spun, combed yarn woven into other fine weaves has been excavated from a number of other Viking Age sites in northern Europe, the particular very lightweight tabby cloth found in Dublin is unusual. An interesting observation was made by Hägg from the group of textile remains at the Viking port of Haithabu. There, both Z/Z and Z/S-spun cloth was found. After careful study, and relating the textile remains to particular garments, the use of cloth made from Z/Z combed and smooth spun yarn was linked with fine-quality fabric made into more elegant clothes (Hägg 1988, 192).

Comparanda for wool textiles

The cloth used for the headcoverings does not seem to have been found in other Viking Age settlement sites. Some surviving wool textiles of similar date may be compared to the

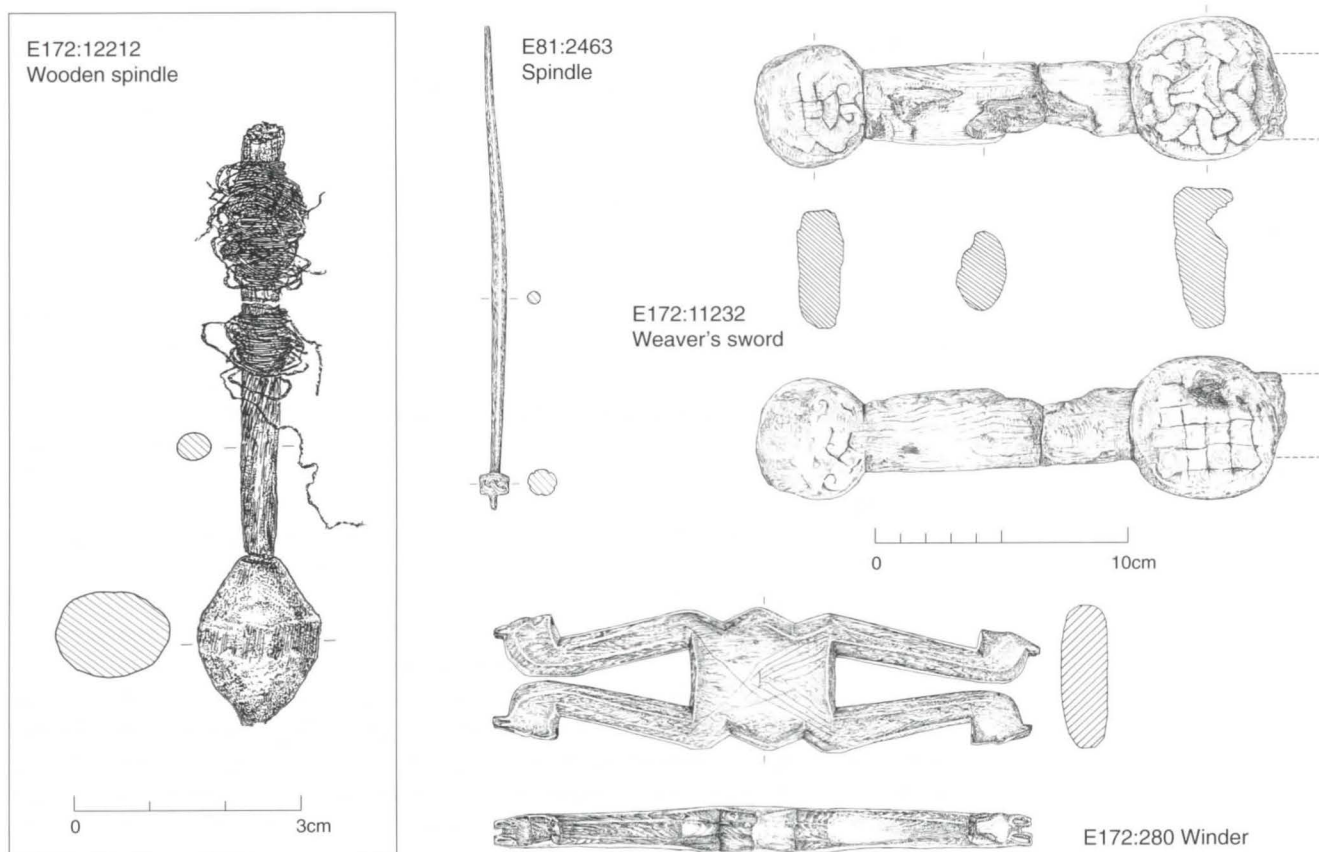


Fig. 82. Weaving tools from Fishamble Street and Winetavern Street.

Dublin pieces. Perhaps the fragility of the fine yarn used and the open weave of the cloth have limited their preservation. Some that may be relevant are from Mammen, Denmark (Hald 1980, 105, 111), Nyköping, Sweden (Franzén and Geijer 1968, 131–2), Oseberg, Denmark (Ingstad 1982, 92), Oslo, Norway (Kjellberg 1982, 132), Leens, Holland (Schlabow 1974, 194, 211) and Lagore Crannóg, Co. Meath, Ireland (Start 1950, 222). This last is a piece of wool cloth (no. 1652), from levels apparently dating to the seventh century, which is Z/Z spun with thread densities of eleven and thirteen per centimetre. The yarn diameter is 5mm, which of course produces a much thicker and denser cloth than the Dublin examples. It is not as finely combed and spun. At present this is the nearest Irish parallel, but it is not comparable—despite Start's assertion that 'as a result of the fine yarn and the comparatively few ends and picks to the inch, the weave is an open one'.

Textile C1356 from the tenth-century chieftain's grave at Mammen closely resembles the Dublin wool cloth pieces. It has Z/Z-spun yarn, 'fairly loosely' woven and with a density of 20×16.5 threads to the centimetre. Its function is unknown.

Among the Viking Age textiles from Haithabu a few—some may be wool—are described as gauze-like tabby-weave veiling (*Schleiergewebe*). These were found in graves mainly of the ninth century and so tend to be mineralised. They are woven from smooth Z/Z-spun yarn in an open weave. The thread densities are in the order of $12\text{--}15 \times 13\text{--}10$ per centimetre (Hägg 1991, 230–3). Some of these small pieces, if they are wool, could be related to the Dublin cloth.

The wool Z/Z tabby remains from the Viking Age market centre at Kaupang include several pieces with thread densities of $18\text{--}20 \times 12\text{--}14$ to the centimetre. They are described as being of excellent quality, evenly and firmly beaten. The threads are equally thin in both systems and are well defined (Ingstad 1988, 133). It seems likely that these belong to the same family of tabby-weave cloth as the Dublin pieces, although without note of the thread diameters the true relationship cannot be established.

Bender Jørgensen has comprehensively analysed and catalogued Viking Age textiles from Northern Europe; the interested reader may wish to pursue comparisons further through her catalogues (Bender Jørgensen 1986). Graphs of warp/weft counts for the

Dublin open weave tabbies, together with Viking Age tabbies from Denmark, Sweden and Norway from Bender Jørgensen 1986, are shown in Fig. 84. It should be noted again that measurements of yarn diameters are not available, so that comparisons based on the relationship between the open character and the fineness of weave cannot be made.

Silk cloth

Weave, yarn and dimensions

Cloth types

Although all are of a tabby weave the 27 silk textiles divide into three groups according to the twist chosen for the warp and weft yarns. The first group consists of eleven pieces woven from fine Z/Z yarn; six of them form a distinctive sub-group made in a crêpe-type weave. The second group consists of twelve examples of a denser weave cloth with Z-twisted warp and untwisted weft. The third group consists of examples where the silk yarn has been left without twist in either system; there are four pieces of this sort. The tabby weave in the three groups varies from a very light open construction, which might be described as 'gauzy' (although it is not a gauze weave), to a dense woven cloth, to which a thicker untwisted weft adds a sheen. It is clear that the throwers and weavers were making deliberate choices in the preparation of yarn and the selection of relatively fine or thick threads to create the particular effect desired.

The silk textiles are 80–240mm wide where both selvages are present. The longest piece is 840mm but it may have been cut from an even longer cloth since the ends are hemmed. Others are 700mm, 670mm and 595mm long. It is possible to give the actual or estimated complete size of some of these pieces. This is particularly true of the Z/Z yarn textiles, where nine out of eleven pieces have both selvages. Among these are three complete loom-pieces with fringes indicating the starting/finishing borders; the dimensions are 610mm × 220mm, 595mm × 210–230mm, and 700mm × 210mm.

In contrast to the Z/Z cloth, it was not possible to establish the width of the Z/no-twist pieces since none retains both selvages; nor do they have starting or finishing borders, so the original lengths are unknown. The Z/no-twist silks tend to retain one selvedge and have

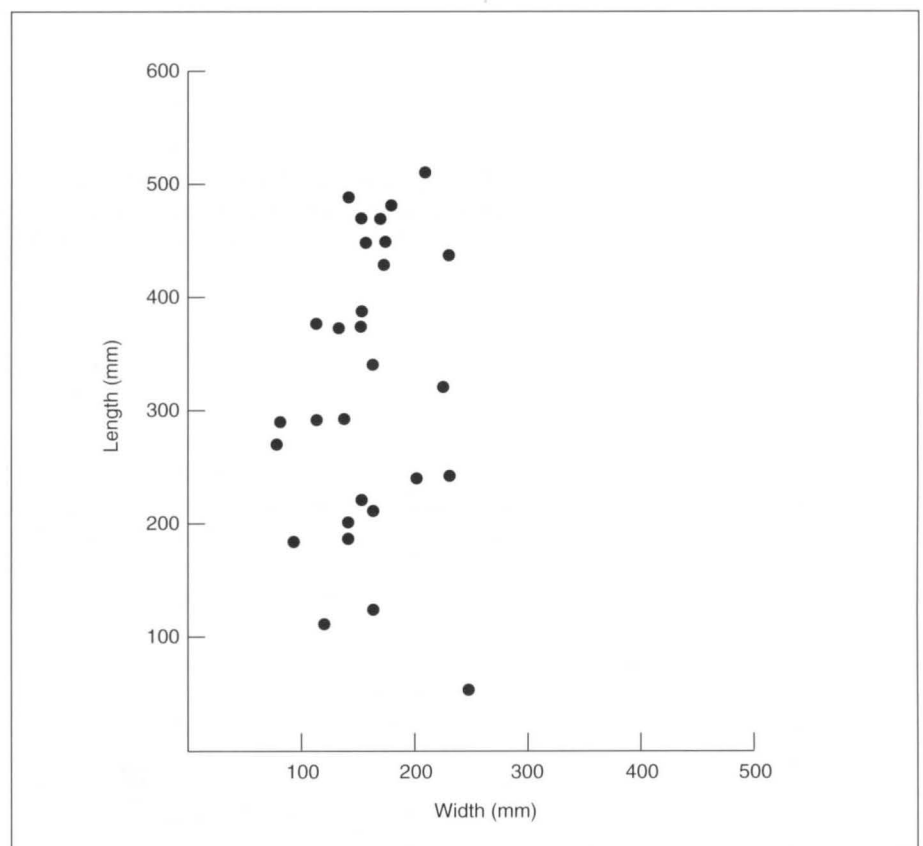


Fig. 83. Graph of wool textiles by length and width.

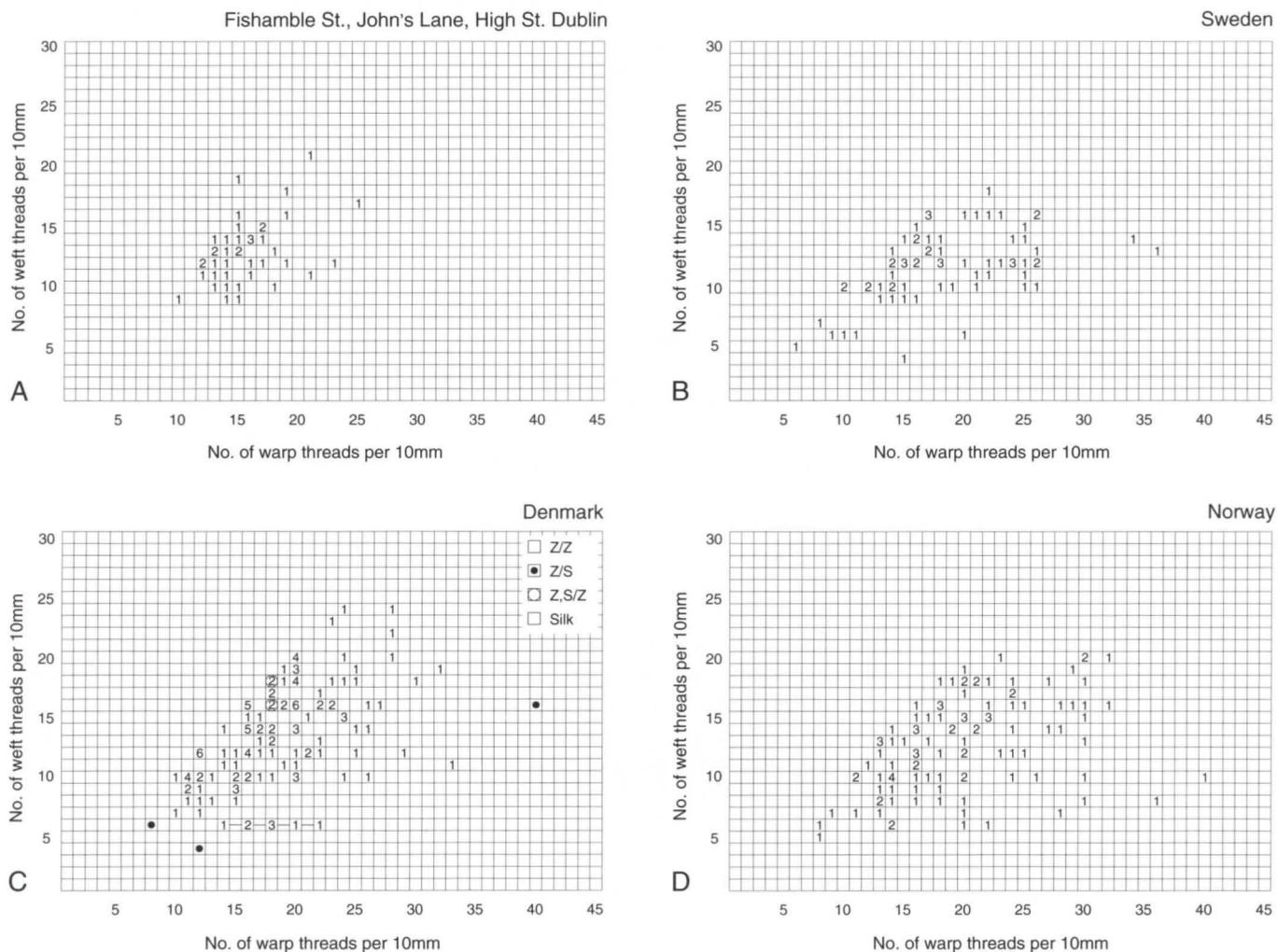


Fig. 84. Graph of Dublin and Scandinavian wool tabbies (graphs for Denmark, Sweden and Norway are from Bender Jørgensen 1986, 87, 90, 94; reproduced with kind permission of the author and the Royal Society of Northern Antiquities).

the second edge cut and sewn, which suggests that they were cut from a larger piece of cloth to the particular size desired. The pieces of cloth made from thread without twist are too fragmented to give any information about their original dimensions on the loom.

Silks of Z/Z twist yarn (Table 8)

The Z/Z pieces (with one exception) are much the same type. Very fine yarn used in an open weave created a cloth of a weight and texture that drapes well. Six of the eleven pieces have traces of decorative fringing at the ends: five could be described as scarves and one as a narrow band. There is a variation of this extremely fine, light weave where a crêpe-type yarn has been used in both systems. This occurs in six pieces where the yarn is well crimped, so that the cloth has a 'gauzy' appearance. In this weave there are more threads per centimetre in the warp than in the weft system. The degree of twist in the yarn in both systems is loose to medium but the yarn is springy to the touch, which seems to produce the crêpe-like cloth finish. The yarn diameters on these six pieces are very fine, with six systems centring on 0.10 mm and the other six ranging between 0.09–0.14mm and 0.16–0.19mm. The density of threads per centimetre ranges from 30–41 warp/19–32 weft to 16–26 warp/12–15 weft. These textiles have survived well since five items have both selvages and, apart from the textile discussed below, they are the largest pieces in the sample. Their use as possible headcoverings is considered above under the heading 'Scarf type' (p. 4).

One Z/Z piece, DHC17 (Pl. III, Fig. 27), is not woven in this light, open weave. It has been woven from yarn that is considerably thicker, so that a heavier and denser cloth

was produced. This silk is 870mm long \times 240mm wide and is the largest piece in the sample. The piece was dyed with lichen purple and although now in a poor condition it must originally have been impressive. Its suitability as a headcloth is also discussed above under 'Veil-type silk' (p. 4).

Silks of Z/no twist yarn (Table 9)

Twelve silk textiles are made from Z/no twist yarn. Here the weave is comparatively dense, and in eleven cases the fabric still retains a distinctive golden brown tint, perhaps its natural undyed colour. The twelfth has a rosy red tinge. The weight of the cloth makes it suitable for general use as a dress material. There are, however, no pieces that are readily identifiable for use, for example, as neck or wristbands for a tunic.

Two caps have been made from this type of silk, and there are the possible remains of a third. These Z/no twist silks have strong affinities with pieces found at the sites mentioned at York, London and Lincoln, with similar dating and Scandinavian trading links. Yarn diameters lie between 0.05–0.13mm and 0.45–1.00mm. Thread densities per centimetre range between 17–20warp/24–27weft and 28–33warp/26–31weft. More details of the two caps and the material from which they were made are given in Table 3 (DHC37 and DHC39).

Silks with no twist yarn (Table 10)

Two of the four silk pieces with untwisted warp and weft systems are only small fragments, and the other two consist of strips of fabric that have been knotted together to make longer pieces. They are too small to furnish much information about the original size of the loom piece. Distortion is very pronounced in this no-twist cloth, so that it is difficult to establish the original density of the weave. The yarn diameters range between 0.11–0.12mm and 0.45–0.50mm.

Reinforced selvages woven with higher concentrations of warp threads (Table 11)

Reinforced selvages occur on all three groups of silks but most frequently on the Z/no twist group. They are also a feature of silks made of Z/no twist yarn found at York and Lincoln (Muthesius 1982, 132–3) and on silks of no twist construction from Switzerland (Schmedding 1978, 78–9, 195–6).

Fringes and tassels on silk pieces (Table 12)

There are six fringed pieces out of a total of 21 items; but all are made from Z/Z silk, representing 54 per cent of this group. Five of the six pieces are between 180mm and 220mm wide; the sixth is only 100mm wide. Warp loops exist on four pieces, so the fringing represents the starting and/or finishing of the piece. Even where there are no loops the fact that the warp ends are plied in pairs before being cabled into larger groups suggests that these fringes were headings and finishings, since they would be automatically paired when slipped off the loom, and so easily twisted. Examples of fringes can be seen in the catalogue entries for DHC8, DHC10, DHC11 and DHC12 (Figs 18, 20, 21, 22, Pl. II).

The tassels were often plied directly from about twenty pairs of warp ends, and then two or five sets of twenty were cabled together. In DHC11 two sets of 16–20 Z-plied warp ends were then S-cabled together to form a tight cord c. 2mm in diameter and knotted at a length of c. 80mm, with a further 20mm left to fall loosely in individual pairs. This is the most complex fringe found, although some are so badly deteriorated that the original design may be lost.

The decorative fringes suggest that these pieces were worn so that the ends were displayed. This finish would be unsuitable for wearing in any way that involved strain or tension at the ends. The loom for these pieces may have been about a metre long (plus some extra centimetres) and at least 300mm wide.

In five textiles there are fringes at both ends. In three the length of fringe at one end is not the same as at the other. The differences—20mm and 50mm, 30mm and 60mm, and 60mm and 100mm—seem to be too large to be a chance occurrence. This may be a feature of the weaving technique used.

Dye tests

Dye tests carried out on ten of the silks were positive in four cases (see Appendices 3.2 and 3.3). Traces of alizarin were found on two pieces, showing that madder had been used. In one textile lichen purple was detected but the exact species from which the dyestuff was made cannot be isolated. The various lichens of the genera *Rocella* and *Lecanora* (*Ochrolechia*) are widespread in Europe, particularly in coastal regions. A fourth textile showed possible traces of indigotin, the chemical of the blue colour of woad, which by early medieval times was grown generally in Europe. Appendix 3.1 discusses medieval dyeing in more detail.

Comparable material for silk cloth types

The tabby cloth described here is similar to finds in Britain and other parts of Europe. The three categories of plain-weave silks made from yarns of Z/Z, Z/no twist and no twist/no twist construction are well known in Europe generally. The types of tabby weave have been discussed by Frances Pritchard (Pritchard 1988, 156) and by Penelope Walton (Walton 1989, 360–75).

Two sizable bodies of comparable material exist: the larger, from the medieval period, is published in the catalogue of silk, wool and linen cloth from Swiss churches and cloisters (Schmedding 1978); the second is from the Viking Age excavations in York (Walton 1989, 360–7, Muthesius 1982, 133). Plain-weave silk fabrics have also been found on Viking and other sites such as Jelling and Mammen (Hald 1980, 119 and 106), Perth (Bennett, pers. comm.²), Lund (Lindström 1982, 180) and London (Pritchard 1984, 60–1 and 70). A few tabby-weave silks described as ‘taffeta’ were found in the tenth-century graves at Birka (Geijer 1938, 86). Figures 85, 86 and 87 illustrate details of some of these pieces.

Both the Swiss and the York silks include pieces comparable to the Dublin textiles. However, some Swiss pieces are at least twice as wide. They also include examples of the ‘crêpe type’ Z/Z silks (Schmedding 1978, 310). One Z/Z piece from York is a strip 1.63m long, almost twice as long as any examples from Dublin or Switzerland, so the Dublin textiles are not at the upper size limit of these weaves.

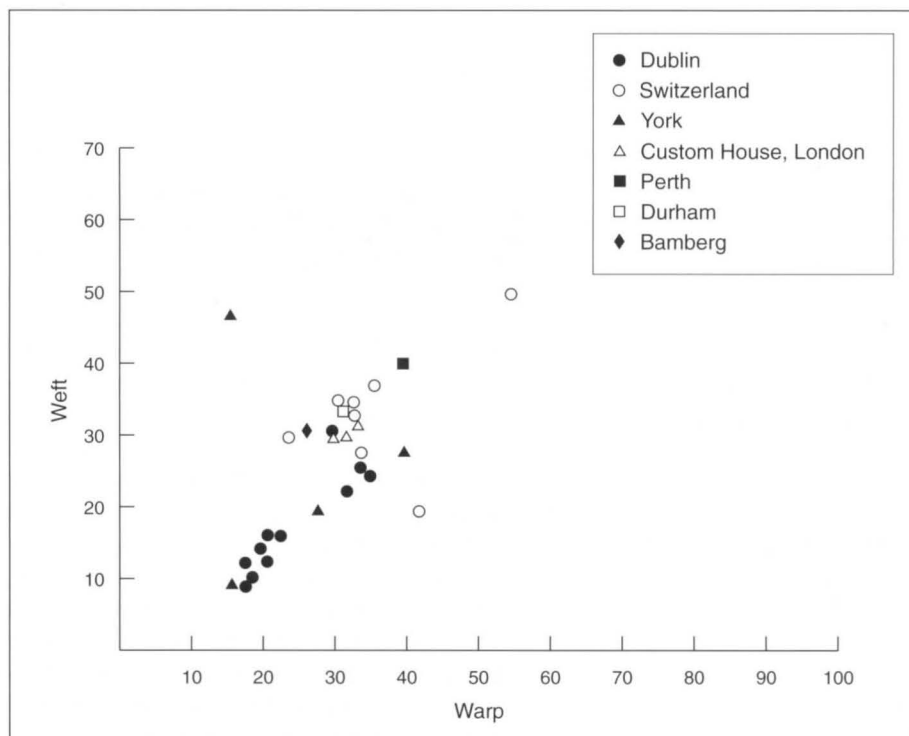


Fig. 85. Graph of comparable material for silk textiles: Z/Z thread.

2 I am grateful to Dr Helen Bennett for sharing information from the Perth excavations.

Fig. 86. Graph of comparable material for silk textiles: Z/no twist thread.

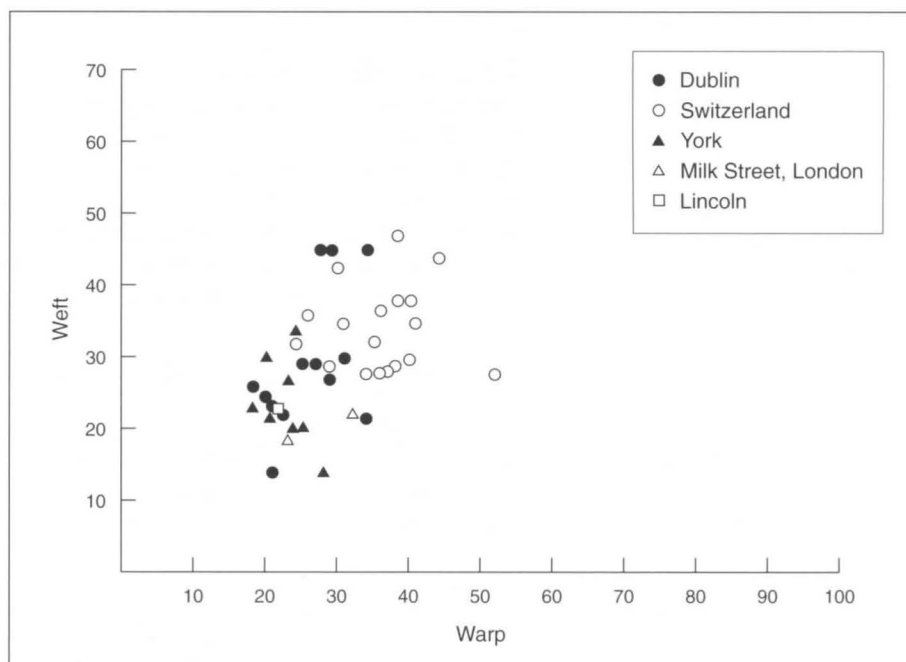
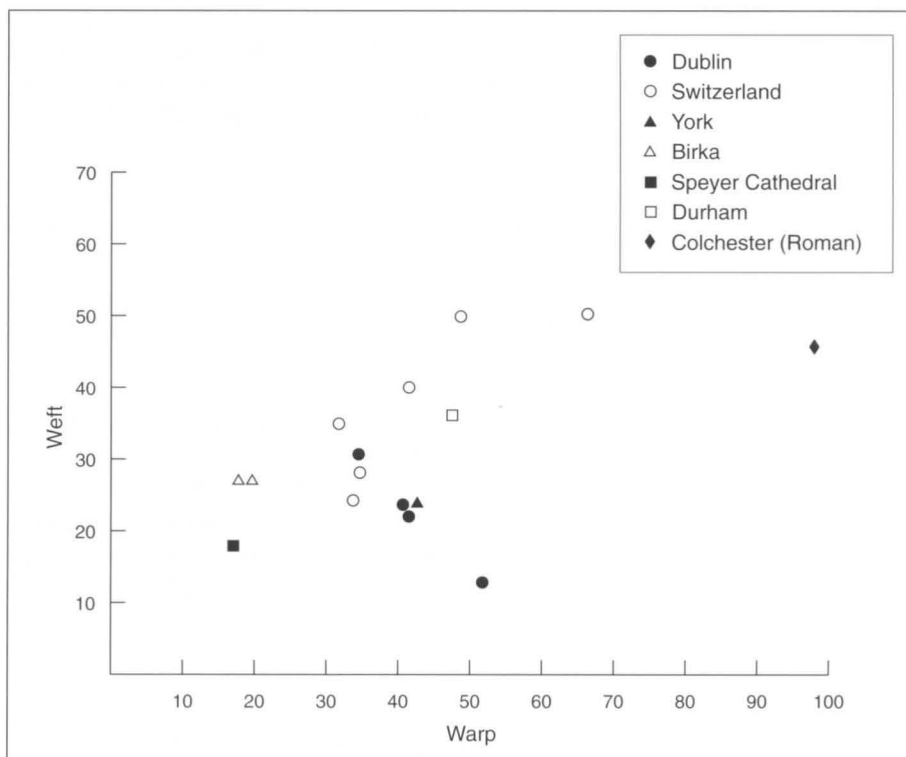


Fig. 87. Graph of comparable material for silk textiles: no twist in either system.



Comparisons between silk and wool cloth

Comparisons between silk and wool pieces were made to see whether methods of construction and the resulting cloth were related, and whether an attempt had been made to copy the silk weaves in wool. The wool pieces are made from Z/Z-spun yarn, whereas the silk pieces are woven from three different yarn combinations: Z/Z, Z/no twist and no twist in either system. Because of the lack of twist in the thread no direct comparison can be made between the wool cloth and silk pieces of the two latter thread constructions. Comparisons can be made only between the Z/Z wool and silk cloth (Fig. 88 shows the comparative length and width of these pieces). One point to be noted again is that some of the silk pieces of Z/no twist yarn have been cut down from cloth that was wider and longer than their present dimensions. They now match in size some of the wool pieces

Fig. 86. Graph of comparable material for silk textiles: Z/no twist thread.

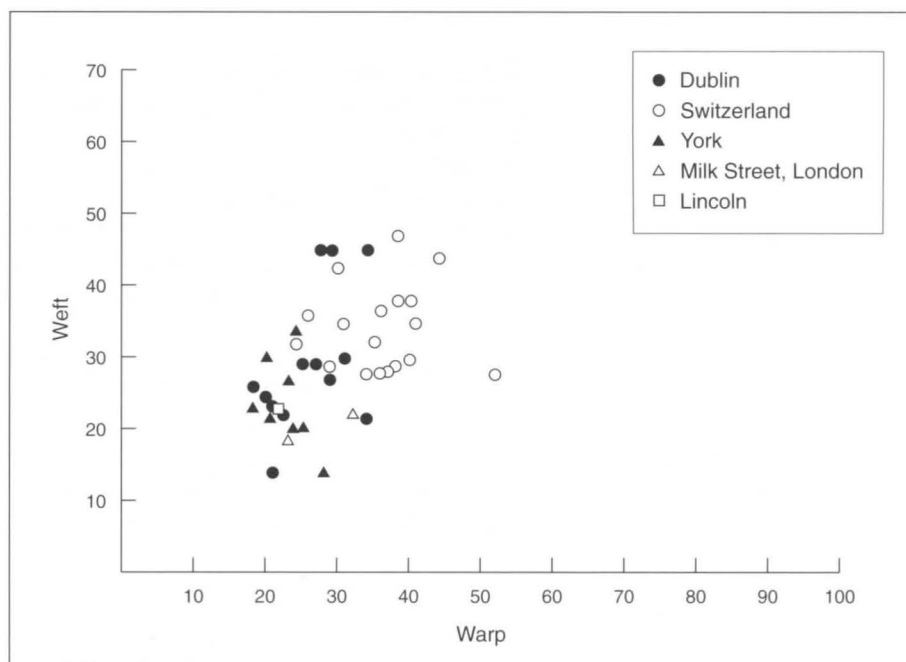
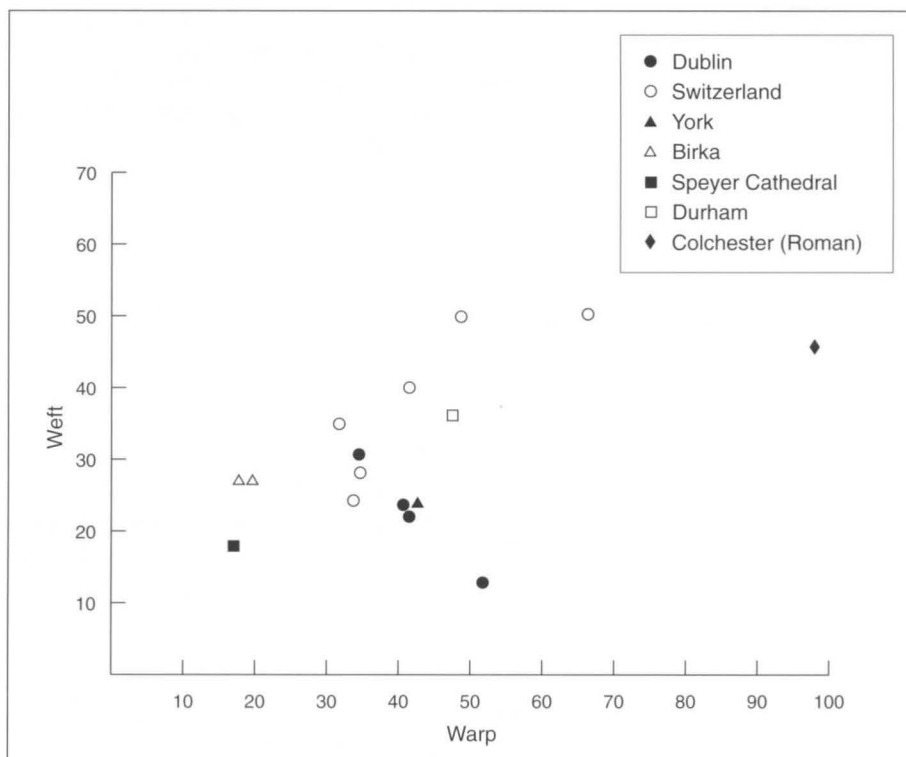


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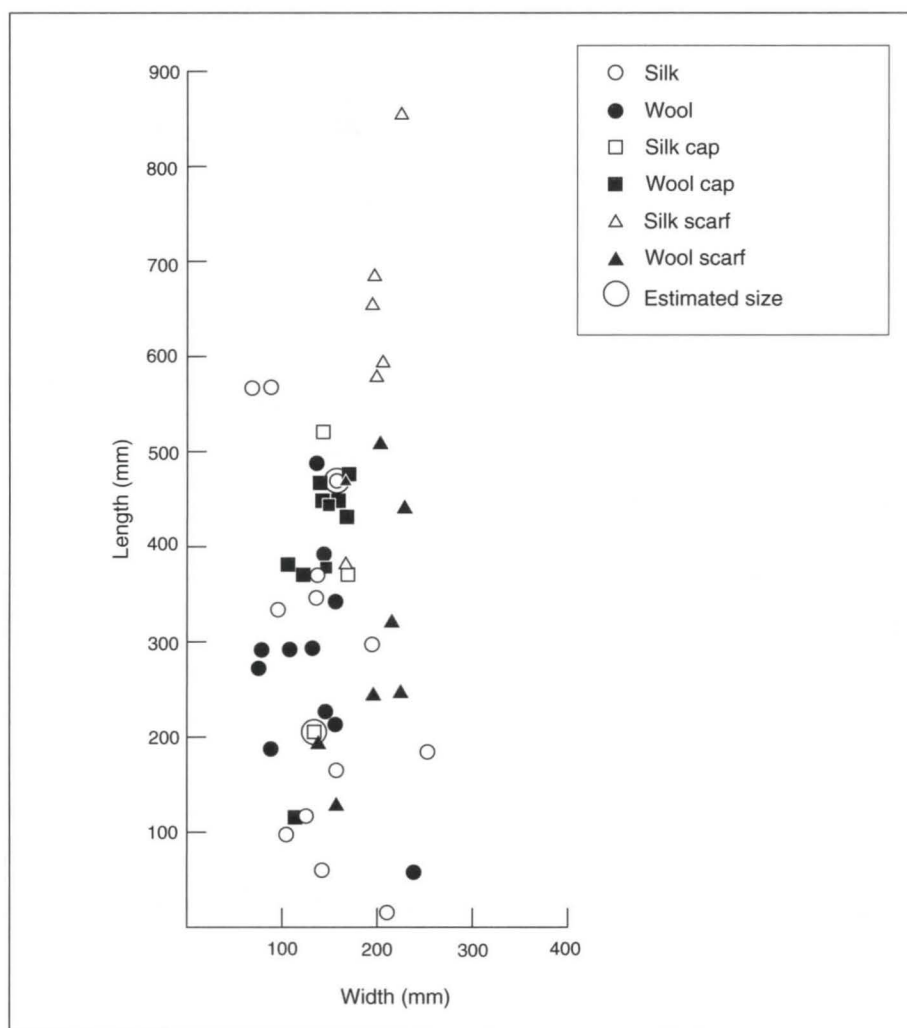


Fig. 88. Graph of comparative length and width of silk and wool pieces.

that are unaltered and have both edges. If they were cut down to conform to the size of the wool pieces, both of whose selvages are still present, then it suggests the wool loom-pieces do not copy the silks. They could well be made in different places.

Both the wool and the silk textiles include examples where there seem to have been one or more extra warp ends at the selvedge—perhaps to strengthen the edge of the cloth. In two cases, DHC34 and DHC11 (Figs 54, 21), two of these ends remain in place (see Fig. 89).

Since at least one wool fragment, DHC46 (Fig. 66), is 255mm wide, it is clear that greater widths could have been woven in wool if desired. No attempt has been made in the wool cloth to reproduce the effect of the silk Z/no twist and no twist/no twist pieces. Some approximation of their more solid weave could have been achieved by using yarn to a greater density per centimetre in the weft system than the warp. The wool tabby weave seems a well-established product in its own right.

Wool and silk pieces both using Z/Z-spun yarn

None of the surviving wool textiles matches the length of the larger silks; the longest wool (DHC2, Fig. 12) was probably 520mm and the longest silk (DHC17, Pl. III, Fig. 27) c. 870mm. Both silk and wool pieces employ fine yarns almost always with a loose to medium twist, and open spaces are left between threads. The wool yarn is thicker than the silk but this results from the limitations of the raw fibre.

DHC24 (Pl. IV, Fig. 34) is a Z/Z silk band whose ends were hemmed to a length of 350mm; it measures 120mm selvedge to selvedge. This is similar to two wool pieces, DHC21 (Fig. 31) (385mm × 120mm) and DHC18 (Fig. 28) (386mm × 160mm). The

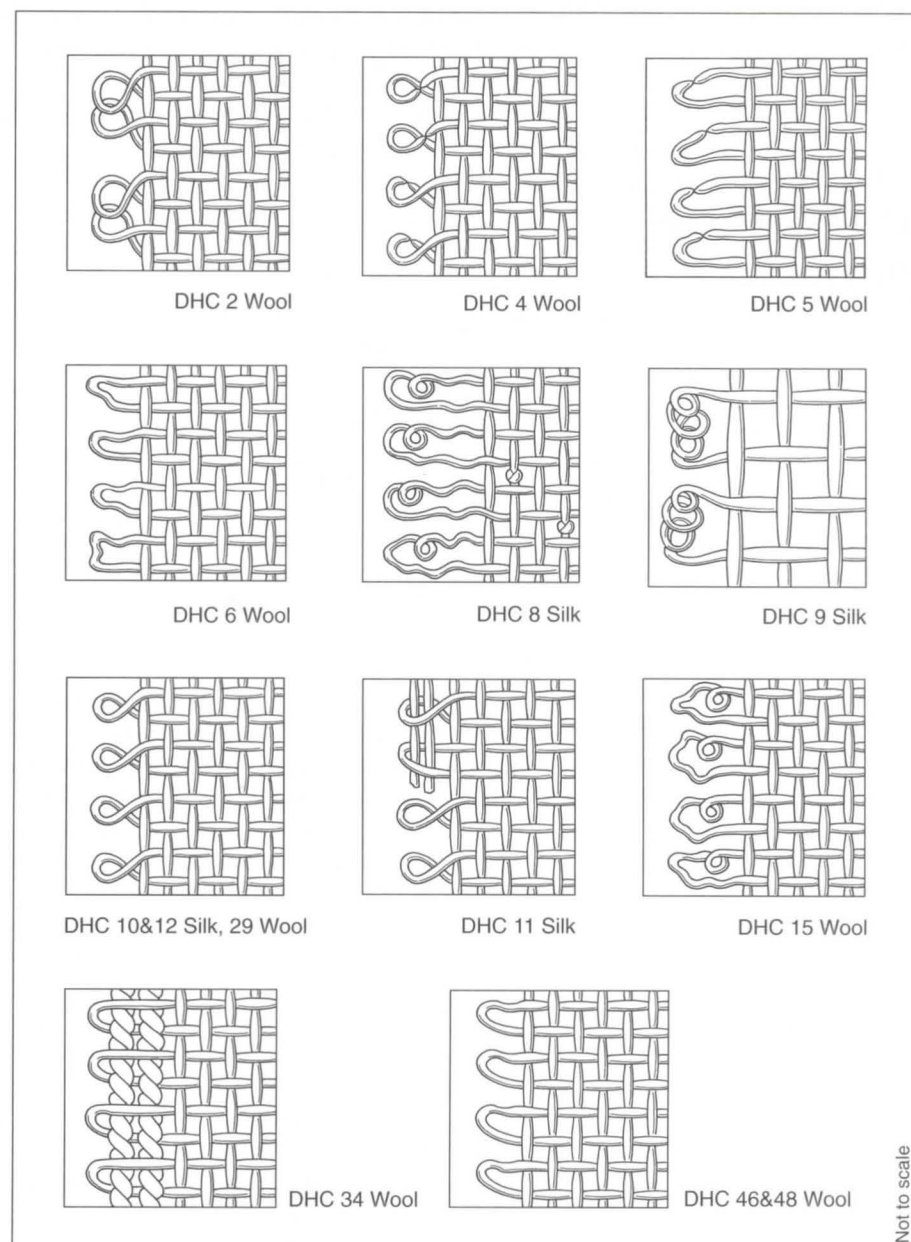


Fig. 89. *Loops of thread extending from weft picks at selvage.*

texture of the silk band is very light. There is no clear evidence that the wool bands copy the silk piece, but it is a possibility.

Fringes

Both silk and wool Z/Z yarn pieces can be fringed at each end, and decorative finishes have been used on both types of textile. The silk fringes, however, are worked differently from the wools. The practice in the latter of plying paired and twisted warp ends in twos, and then cabling again in sets of two (and sometimes in further sets), is not repeated in the silks. In these pieces much larger groups of paired and twisted warp ends are S-plied; in one case five groups of eight are Z-twisted, in another nine to twelve pairs are Z-twisted and then two sets of each are S-plied. The number of ends per tassel in the silk pieces centres on 40; the equivalent figure for the wool centres on groupings of 16–20. The difference may relate to the finer yarn used for the silk cloth. The different fringing techniques for the wool suggest a cultural tradition other than that of the silk cloth.

In conclusion, some of the silks are much longer and wider than the wool pieces; this appears to be the major difference apart from those imposed by dissimilar raw material. The methods of construction seem similar but not identical, which would be

consistent with production in different centres with perhaps some relationship between the types of loom used (see below, 'Cloth production and loom types'). From the differences in size and construction of the fringes it seems that the two groups of textiles were made in different workshops. The wool pieces do not look as if they are copies of the silks.

Cloth production and loom types

Looms and cloth size

The specific sizes of the open-weave tabbies prompted consideration of the technical and cultural elements involved in their production. In general, at least three factors influence the size of woven cloth.

- (1) Loom size that is regulated by the level of technology in a particular community.
- (2) Cultural and economic factors that govern the pattern of the article of clothing.
- (3) Regulation of size by society, e.g. recognised measurements desired or required by traders or bureaucrats.

Loom size and type

There is no archaeological evidence to date about the looms used in tenth-/eleventh-century Dublin, but we do know something of contemporary European looms. Upright two-beam looms have been known since classical times and may have been employed for a variety of purposes during the Middle Ages (Hoffmann 1974, 324, 330). The earliest and only surviving remains of a loom from an archaeologically sound context are those from the Oseberg, Norway, ship burial of AD 834 (Hoffmann 1974, 391). This small upright loom is 1190mm high and 750mm wide. Figure 90 shows how the lower beam can be moved up or down to adjust the length of the piece. A slender rod, 330mm long and 20mm in diameter, fits into a groove in the upper beam and was originally tied into place. The central point of the lower beam has been shaved down to a narrower dimension, and this part is also c. 330–340mm in length, presumably to match the upper rod. The loom was worked by one person.

The overall dimensions and method of construction of the Dublin open tabbies suggest that a loom of the Oseberg type might have been used for their manufacture. Since none of the wool pieces is wider than 255mm or longer than 520mm all could have fitted on a loom of 1190mm × 750mm. Although the Oseberg loom is earlier than the Fishamble Street and John's Lane occupation levels, it is likely that this type was still in use less than a hundred years later. There are also the strong Norwegian connections to the Dublin settlement.

Among the many bone weaving tools found in the settlement are some beaters now associated with the upright two-beam loom. These include single-ended beaters with one pointed end used to beat up the weft on the loom, like E172:237 (125mm long) and E172:9705 (170mm). Both Walton Rogers and Henry have linked these pin-beaters with the two-beam loom (Walton Rogers 1997, 1755–7; Henry 1998, 159).

The skilled coopers, turners, shipwrights and carvers working in the Hiberno-Norse community (Wallace 1984, 121) would have been well able to make these looms.

Warp-weighted loom

It seems unlikely that the wool fabrics were woven on the large warp-weighted vertical loom that was in general use in north-western Europe at least from the Migration period (c. AD 350–800) until the end of the Viking Age. Hoffmann has argued convincingly that a separately woven starting border is the mark of the use of the warp-weighted loom (Hoffmann 1974, 170). As we have seen there are no such borders in this sample; starting and finishing headings of looped ends vary between 30mm and 100mm.

There is no positive evidence for warp-weighted looms in Ireland in the Viking Age. Possible loom-weights have been found at Fishamble Street and John's Lane but they are of a shape and material unlike weights found in other contexts where they are accepted as clearly related to these looms. Loom-weights found in secure contexts in Anglo-Saxon and contemporary Scandinavian sites were, if made of stone, larger than the Dublin

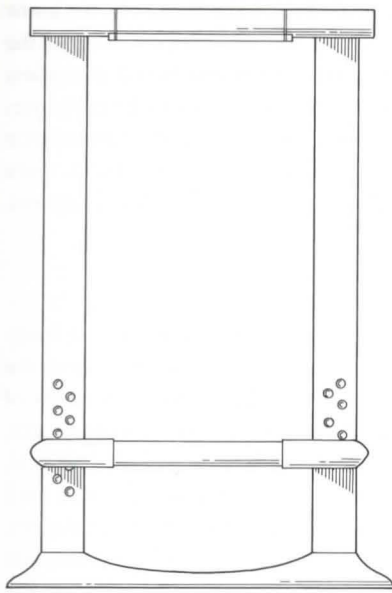


Fig. 90. Diagram of Oseberg Vestfold loom, Norwegian, ninth century AD (Viking Ship Museum, Oslo).

shaped stones, or were made of baked clay in a doughnut shape. These baked clay weights were found in Viking Age York (Walton Rogers 1997, 1753).

Looms in Byzantium

No doubt the imperial silk workshops in Byzantium employed different types of loom to produce fine textiles for the court, some of great complexity (Muthesius 1997, 19–26; Geijer 1979, 128–9). A possible loom type for the Dublin tabby silks is shown in a miniature in an eleventh-century Byzantine Octateuch showing a single weaver using a small loom apparently supported by some kind of desk (Fig. 91) (Hussey 1965, 117). It may be that the loom was being used for tapestry work of some kind. From the illustration the loom seems about 1.5m long and 1m wide, and something of this type might be suitable.

Cultural factors in determining clothing patterns

It is likely that cloth needed for a particular garment was made to that specific size. This practice is widespread in subsistence economies past and present. In the recent past in Central and South America, for instance, looms were often set up to weave only the short length required for ponchos (Burnham 1973, 7). The use of a wide loom in the Classical Age predetermined the shape of the tunic and toga; whereas the narrow loom of the East led to more slender, seamed garments (Burnham 1973, 3).

In the rural subsistence economies of early medieval northern Europe families would have planned each year to provide most domestic textile needs from a fixed reserve of wool and linen. This reserve was linked to the number of sheep carried on available land and the amount of flax grown. (The fleece from a sheep might have provided only 1–2kg of wool per annum, providing enough yarn for 1.3–4m of cloth.) The fleece from a Soay sheep, a Bronze Age type still extant, weighs c. 0.5kg (Ryder 1983, 708).

The position within the Hiberno-Norse town of Dublin was less constricted, since (as the nature of the settlement indicates) a trading economy prevailed. The large population of the town was fed and supplied by its hinterland, which was controlled by the authorities in Dublin (Wallace 1987, 203–5). It is likely that the family unit would have been less tied to the limitations of subsistence farming, and townspeople could probably buy in whatever supplies of wool were needed. Recent analysis of trading patterns between Birka and the hinterland of Mälaren region suggests that settlements

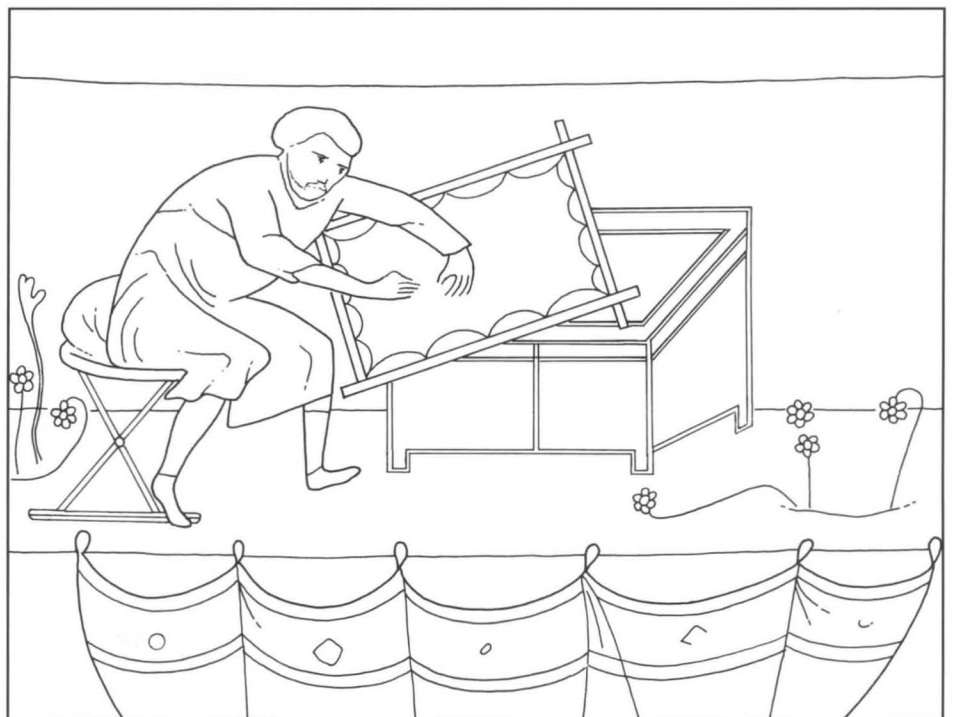


Fig. 91. Weaver at work, Byzantine Octateuch, eleventh century AD (Biblioteca Apostolica Vaticana, Rome).

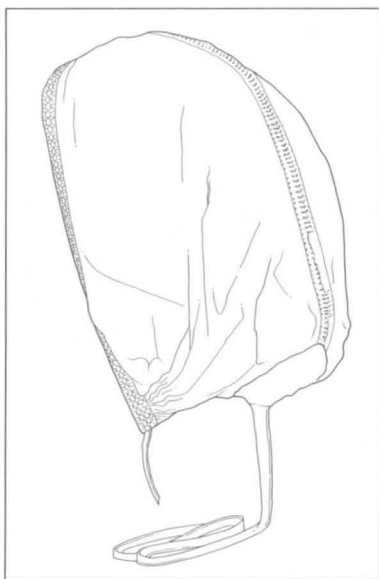


Fig. 92. Cap of St Birgitta of Sweden, fourteenth century AD (Birgittine Convent of Maria Refuge, Uden, Holland).

there may have supplied wool to Dublin (Andersson 2003, 112, 135). However, we know that people were taking part at least in the latter part of the productive cycle of the subsistence economy; spinning and weaving cloth were still home-based activities. Proof of this comes from the spindles, spindle whorls, weavers' sword-beaters, pin-beaters, tablets for tablet weaving, wood beetles and bone needles found in abundance in Dublin (Wallace, pers. comm.;³ Pritchard 1988, 151). They show that women were making cloth directly in response to the needs of their households. The wool scarves, bands and caps may well be in this category.

Complete loom-pieces used for dress

The use of small rectangular pieces of cloth for caps, bands and scarves is a long-established practice. It is thought that all early dress patterns are derived either from the shapes of animal skins or from pieces of cloth as they came from the loom. A series of garments, the earliest dating from the Bronze Age, was made from complete loom-pieces, which were wrapped or draped without cutting or stitching. These included shawls, aprons, wrapped skirts, kilts and cloaks, which continued to be worn in folk dress until modern times (Hald 1980, 376). The Dublin wool headcoverings belong to this category. The original shape of the loom-piece is still clearly seen in the caps; although they are stitched and lightly shaped the original rectangular cloth piece is used without any additions. By contrast, in the widely worn caps of the thirteenth and fourteenth centuries the cloth was cut to the shape of the crown so as to fit the wearer's head. The fourteenth-century linen cap of St Birgitta of Sweden is a good example of the later pieces (Andersson and Franzén 1975, 5–17) (Fig. 92).

In the Dublin caps the curve at the crown of the head was produced by stitching without any cutting. The measurements of the wool caps and scarves show that those loom-pieces are closely related in size and type of cloth; even when stitched they are very similar. Although sewing skills were competent, cloth cutting was kept to a minimum, perhaps owing to the lack of refined shears or scissors. Iron shears were the usual tools available, so sewing may have been used more to strengthen joins and edges and for mending than as part of the overall design. A hint of later development is seen in DHC31, where the back of the cap has been cut to fit the curve of the nape of the neck, and the tie area is pleated so that it is both strengthened and shaped to fit the ear. However, DHC31 is from the mid- to late tenth century so does not date to the end of the period when we might expect to see the shape changing (see Fig. 93).

The narrow width of the loom-piece of c. 150–180mm, used in the wool caps and copied in the silks, suggests a northern tradition of using small rectangular pieces as headcoverings. The broad similarity between the dimensions of the caps and scarves also confirms their common ancestry.

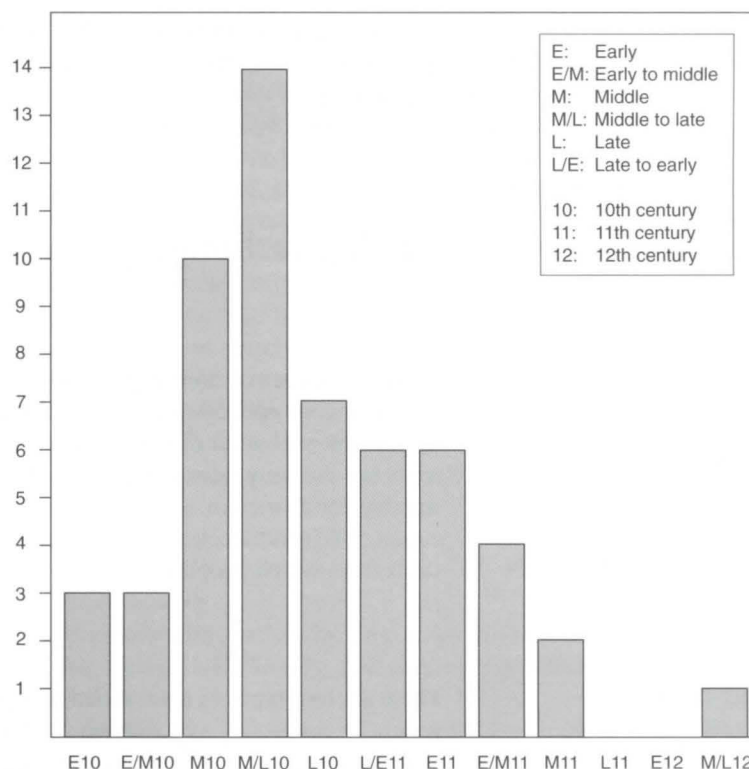
Official regulation of cloth size and use as currency

In the early Middle Ages units of cloth were used as currency and in some instances were produced to a legally determined size. In Iceland pieces of wool cloth in 2/2 twill known as *wadmal* were woven on the warp-weighted loom to specification and represented a regular unit of currency (Hoffmann 1974, 218, 227). In other parts of Europe there was also an association between cloth and currency. In Slavic languages the etymological root of the verb to pay, *placic*, is the same as the word for cloth, *plat* (Wyrozumski 1983, 248). Small silk scarves were used as a means of payment in Prague in the Viking period (Jankuhn 1982, 41). Ibrahim ibn Jacob, writing in the tenth century, describes light net-like kerchiefs that were of considerable value among the Slavs (Pytlewicz 1998, 268). This last reference is interesting, since in the present context both the wool and the silk textiles can be described in this way.

The measures of the ell originally represented differing values based on the length of the arm and the distance between the outstretched arm (fingertip) and elbow or chin. In the later Middle Ages in Northern Europe the ell took on a standardised value of 1140mm,

3 I am grateful to Dr Patrick Wallace for this information.

Fig. 93. Graph of dates of headcoverings.



slightly more than double the length of the original ell. The ell could also be *c.* 950mm, which approximates to the distance between fingertips and chin on an average sized adult. In the seventh and eighth centuries AD the royal Persian cubit of 649mm became established and by the Middle Ages was known as the 'silk ell' since it was associated with the measurement of silk (Skinner 1967, 87). In the ninth century Charlemagne had instituted a system of weights and measures reputed to be based on the Arabic model presented to him by the ambassador of Harun-al-Raschid of Baghdad (AD 787). Work carried out on the system of weights used in commerce in Viking Age Dublin has shown that the Carolingian system had been adopted (Wallace 1984, 125). If the traders of Dublin were using Frankish weights, then perhaps they were also using Frankish measures.

Do the measurements of the Dublin headcoverings correspond to any of these systems? Knowing the varied functions of cloth in the early Middle Ages, it seemed useful to check the lengths of both the silk and the wool pieces. Of the wool textiles that give an indication of original length, nine were a minimum of *c.* 450–580mm, so largely falling within the range of the traditional ell. Evidence comes from Iceland (Hoffmann 1974, 222, 360 and 368) that in the tenth–fourteenth centuries there may have been both an old 'law ell' of 491mm and a longer one of 556mm, perhaps related to the English ell. It is not unlikely, given the links between the settlers of Iceland and Dublin and the English trading connections, that these measurements were also established in Dublin.

The silk pieces of Z/Z yarn construction give the clearest indication of original length: the longest piece is an untypical 870mm, and seven pieces have minimum lengths of 530–700mm (including fringes). It is possible that the 870mm piece represents a measurement of *c.* 900mm, and the shorter ones an unstandardised ell, perhaps related to the Hashimi cubit of 649mm or the Arabian 'Black cubit' of 540mm (associated with Caliph al-Marun, AD 813–33) (Skinner 1967, 87).

These Dublin headcoverings may also have been a kind of currency, woven to certain size categories representing specific values to the traders who dealt in them. Perhaps they are related to those silk scarves traded as money in Prague and to the kerchiefs referred to by Ibrahim ibn Jacob.

It is interesting that the width of the caps and scarves is about the width of the outstretched hand from the tip of the little finger to the thumbnail (*c.* 170–190mm). Traditionally this is a practical measurement of cloth, known as a handspan, which was probably in use for many generations.

Sewing techniques

There is evidence of sewing on eight silk and 22, perhaps 24, wool pieces. This represents 29.6 per cent and 58 per cent respectively in each group. Many different sewing techniques were used (Tables 13 and 14). The sewing skills used in the headcoverings were not the only ones current in Viking Age Dublin. Other pieces show techniques suitable for fabrics of heavier weight intended for different purposes (Pritchard, pers. comm.;⁴ Wincott Heckett forthcoming (a)). There was therefore a repertoire of sewing skills from which people chose the one that suited their purpose.

Hems and darts

There are four types of hem: rolled, folded, oversewn and corded. The *rolled* hem is still generally used today as a finish on silk scarves since it gives the finest edging possible on a light material. On the Dublin pieces the selvages have been lightly rolled and carefully sewn, often with a whip-stitch. This finish is used on both silk and wool.

The *folded* hems on wool items are often doubled under with a turning of 5mm over 5mm (thirteen items). Five pieces have hems 6–10mm wide. It is difficult to estimate the original texture and resilience of the wool cloth, but this width of hem seems to be the narrowest possible within the constraints of working the material. On the silk pieces a narrower hem size, between 2mm and 5mm, probably reflects the different properties of the cloth.

Oversewing a hem from the outside is chosen to close the back of a cap, with both selvages turned equally to the inside to form the hem. This provides a strengthened area where there is tension on the material. Oversewing is also used to join together two narrow pieces of material along the selvages to make a bigger piece. This technique is worked on both silk and wool textiles.

The *corded* hem is used on the front edge of a cap to strengthen and to decorate the selvedge. To achieve this effect a separate cord is oversewn or whip-stitched onto the selvedge. This technique is used only on wool pieces.

Running stitches are used to sew the curved darts on the caps. They are stitched from the outside through the two thicknesses of folded cloth making up the cap, and occur on seven examples.

Stitch size and type

There are no embroideries or decorative stitches on these textiles. With two exceptions there are 2–4 stitches to the centimetre on all the different finishes on the wool pieces. DHC32 (Pl. VII, Fig. 52), a cap, has a rolled hem with seven stitches per centimetre apparently giving a deliberately heavy finish to achieve a particular effect. Generally, the stitch size is 1–4mm, again with one exception. DHC33 (Pl. X, Fig. 53), a cap, has long stitches of 6mm to create a particular finish on a 5mm-wide cord sewn to the front edge.

On the silk pieces there is a higher number of stitches (3–6) per centimetre and a smaller average stitch size (1–2mm). This is probably a function of the fabric being sewn; it may also reflect a greater degree of care being taken with a precious material.

4 I am grateful to Ms Frances Pritchard for this information.

Piecing of fabrics

DHC38 (Pl. XIII, Fig. 58) is interesting as it is constructed or patched together from five different pieces of silk. Three parts have been pieced together to form a rectangle and two patches added to cover worn areas. In DHC56 (Fig. 76) (wool) and DHC59 (Pl. XIV, Fig. 79) (silk) two narrow strips, probably from the same long thin off-cut, appear to have been cut in half and pieced together selvedge to selvedge. On DHC59 the two outer sides of the fabric have been further extended by flat-fell seaming cloth onto them. Although only tiny pieces of these extensions remain, the flat-fell seaming and shreds of silk can be seen clearly. On one corner of this piece the hem has been turned under at a 45° angle to neaten the two edges and form a mitred corner.

DHC59, almost a sampler of sewing techniques, cannot be identified as a particular type of headcovering. As noted above, the silk cloth is pieced together in three places with two different methods: oversewing and flat-fell seaming. The other two edges are hemmed again using two different techniques: one edge and part of the second were double folded and hemmed, and the second part of one end was rolled and whip-stitched. Finally, one end of a flat-fell seam has been neatly mitred, so at least five different sewing techniques were used.

Patches

There are five pieces with patches, in some cases still attached, in others associated with the textile. In only one, DHC43 (Fig. 63), was it not possible to see where the patch was attached.

DHC32 (Pl. VII, Fig. 52), wool cap: large patch over ear area, patched from inside. Patch edges turned under once and stitched in place.

DHC38 (Pl. XIII, Fig. 58), silk cap?: two patches, one attached, one now loose, but stitch-holes show possible position on fabric. Two opposite edges folded 5mm wide, not sewn; two opposite edges double folded 1–2mm and stitched.

DHC39 (Pl. XII, Fig. 59), silk cap: double patch stitched onto tie attachment area. Second patch oversewn to first, double folded hem c. 3mm and stitched in place with wool thread.

DHC40 (Pl. VIII, Fig. 60), silk cap: patch now no longer attached but stitch-holes visible.

DHC43 (Fig. 63), wool cap/scarf?: possible patch, both sides turned under to form hem but not now attached.

Darning

There is one example of a cap having been reinforced by darning. DHC40 (Pl. VIII, Fig. 60) is made of silk and has been mended in two places (one area of 15mm × 12mm and another 10mm × 15mm). The thread used is S-plied, two-stranded silk, diameter 0.4mm. The darning is random although the area seems to have been strengthened in one direction first, and then again somewhat at right angles. It is not worked in a regular 'under one, over one' way with the threads strictly at right angles as in darning a hole.

Sewing thread

Both wool and silk sewing threads were used on the textiles. In most cases the fibre of the sewing thread is matched to the cloth. However, in DHC31, a wool cap, a silk thread has been used, and possibly also in one other piece, DHC42 (Fig. 62). In all the other examples wool thread is used on wool. This is usually Z-spun, S-plied, two-stranded and c. 1mm in diameter. The colour ranges from dark reddish brown to black, with most of the thread black. In one instance a three-stranded thread was used to hem the wool band DHC19 (Fig. 29). Visually this thread, made from a woollen yarn of distinctly different colour and texture, looks unrelated to that used to weave the cloth. It is considerably thicker than the yarn used in the weaving.

Seven of the silk pieces were sewn with silk thread. The silk threads are both single- and double-stranded (S-plied). There is a wider range of thread diameters (0.4–1.0mm) than in the wool, and the colours range from golden to dark brown. One silk cap, DHC39

(Pl. XII, Fig. 59), was worked with thin wool thread that is only 0.4mm in diameter, so that the thread used matched the fine-quality cap material. This is in contrast to the wool thread used to sew the wool cloth.

Hanks of silk and wool threads have been found in Dublin sites, so these materials were available to the townspeople (Pritchard 1988, 150). In the Christ Church excavations a small length of very fine silk thread wound around a pottery sherd was found (E122:8014).

In all pieces at the place where the stitching begins the thread is secured by a knot. One example of this is found on DHC39. There are no instances of thread being secured by repeated sewing on the spot as is familiar modern practice.

Discussion

Careful examination of the sewing techniques suggests that the caps and other pieces were made up on an individual basis. Although there is an accepted pattern of construction for the caps, there are many variants and idiosyncrasies. They do not resemble any kind of mass production with institutionalised sewing practices. Since we cannot identify the products of the textile workshops of the period there is no way of assessing whether the level of sewing seen here represents specialised or general practice.

Varying levels of skill are shown on different pieces. In a few instances some of the stitching is uneven and badly placed. This may be due to the inexperience of a young girl or the poor eyesight of an older person. However, it may also be that certain families or groups were more skilled in this work. It would be interesting to know whether these were skills passed from mother to daughter or whether they were taught in textile workshops. Some of the techniques are complex. As we have seen, the sewing skills displayed on the textiles are still known and employed today—for instance, flat-fell seaming, which produces flat, strong joins with no raw edges in the material. It is still current today for shirts and jeans, clothes that take a lot of hard wear at the seams. Flat-fell seaming, piecing cloth and mitring corners are advanced techniques. In general the work on the Dublin pieces gives a clear impression of competence, skill and the ability to draw on the most suitable method for the task in hand.

There are some interesting comparisons for the sewing techniques used in Dublin. Analyses on finds from at least three Viking Age sites have been completed; these include textiles from Anglo-Scandinavian York, an eleventh-century linen shirt from Viborg, Denmark, and remains of garments from Haithabu (Walton 1989, 404–11; Fentz 1998, 249–66; Hägg 1991, 104–10). At all sites variants of flat-fell seams have been recorded. At another Dublin site in the High Street many fragments of a garment (E746:2902), perhaps a jerkin, were found. On some of these, flat-fell seams were used to piece the cloth together (Wincott Heckett forthcoming {a}).

From Haithabu and York rolled and whipped hems are noted and, at the former, hems with cords sewn onto them. The technique of oversewing two edges together and then opening the cloth out flat was also used at York, Viborg and Haithabu. On the Viborg shirt alone eight different seam types are recorded. It is clear that the people making these clothes were not novices. Many other types and variants of seams were employed, underlining the fact that the art of dressmaking in northern Europe was certainly well-established by the tenth century if not long before.

Commerce, trade routes and the origins of the cloth

Discussion

Where did the wool cloth originate?

There is good evidence that the fine wool textiles were made at home; the necessary capacity and technical skills seem to have existed in the community. As we have seen, spinning and weaving tools and fine, well-combed Z-spun wool yarn were found on the site. The yarn is similar to that used for the headcoverings and certainly indicates local production. In more general terms, since the basic Z-spun yarn in varying weights is also employed in other weaves and in other places of Viking influence, it is to be expected that similar yarn would have been widely produced.

Suitable raw material for spinning may have been available locally. There was an increase in sheep numbers by the twelfth century in the settlement at Knowth, Co. Meath, not far to the north-west of Dublin. McCormick suggests that this development could be linked to the institution of a commercial market in wool and wool cloth with the Hiberno-Norse (McCormick 1982, 63, 65).

Thicker Z/Z tabby cloth of dense weave was common in Scandinavian northern Europe at the time (Bender Jørgensen 1992, 32), so the Dublin pieces fall easily within that general context. As we have seen, Z/Z-spun cloth of fine quality made from combed yarn was found at Mammen, Haithabu and Birka (Hald 1980, 105; Hägg 1988, 192; Geijer 1980, 210–11). Of the few examples of Irish early medieval cloth that have survived most use Z/Z-spun yarn (Start 1950, 203–24; Wincott Heckett forthcoming (b)). In contrast, weaving S-spun wool yarn into fine cloth is associated with the eastern Mediterranean, and scarves made of S-spun wool come from there (Geijer 1979, 72–3). The predominance of S-spinning makes it less a possibility that the Z/Z cloth was being produced and exported to the north. It seems most likely that the wool cloth used to make the headcoverings is one of a range of Z/Z textiles of varying weights produced for different purposes in north western Europe.

Where did the silk cloth originate?

In principle the silk cloth could have been made in several places: in northern Europe or further afield in Byzantium or Baghdad, or perhaps in Spain, Egypt or China.

It is unlikely that the silk cloth was woven locally, although we have seen that silk thread was sewn into garments. Irish embroidery skills and the use of silk are described in *The wooing of Étaín* and *The destruction of Da Derga's hostel* (Gantz 1983, 47, 59, 63, 99), although no examples of early medieval work have survived in Ireland. We also know of the long tradition of very fine silk embroideries: *opus anglicanum*, made by the Anglo-Saxons from the beginning of the seventh century (Synge 1982, 2–3, 12–15). There is no evidence, however, for broad-loom silk weaving in northern Europe at the time, and all the facts point to the cloth being a luxury import.

In general, writings like *Aelfric's colloquy* show silk cloth as coming into northern countries: 'The merchant rows across the seas, returning with silk and other rare cloths, with gems, gold spices or perfumes, wine, oil, ivory, brass, bronze and tin, sulphur and glass' (Page 1970, 79). Silk cloth of the more decorative and luxurious type was a highly prized gift at western European courts, and many very complex pieces came from Byzantium (Muthesius 1997, 37–8, 148).

The Arab occupation of Spain in the eighth century led to the introduction of silk weaving and sericulture; both patterned and plain-weave cloth was made. Many of the

known plain weaves were veil-like fabrics (not all made of silk) but with a tapestry border in Kufic script (Geijer 1979, 136). There is no evidence that the Spanish workshops produced plain pieces.

Tabby-weave silk face veils have been found at Qasr Ibrim, Egypt, at a Muslim habitation site dating to the fourteenth and fifteenth centuries. Woven with Z-twisted thread, they measure c. 610mm × 190mm (Eastwood 1983, 35). If they were worn in earlier times, such pieces may have been traded to the north and reused as headcoverings.

China is the home of sericulture and silk weaving; there the use of untwisted thread in cloth was widespread. Does this suggest that the Dublin no-twist silks came from China? Since by the tenth century people in the eastern Mediterranean were routinely using such thread in complex weaves (Muthesius 1997, 163–88), it is very likely that they were also making cloth like that found in Fishamble Street.

A good case can be made for the production of plain tabby-weave silk cloth in the near eastern city of Baghdad. Founded in AD 762, Baghdad lies at the end of the Silk Road from China and by the ninth century was probably the largest city in the world (Barraclough 1980, 205). The area was known to the Scandinavians as *Serkland* (Silkland) with clearly relevant associations, whereas Byzantium was *Grikkland* (Greekland) (Brønsted 1980, 25). Byzantium was so consistently linked with silk production in this era that it is interesting that it was not called *Serkland* by the Vikings. Scandinavian people were certainly trading with the Arab world in the tenth century, since *dirham* coins are found in the north at least from the early ninth century. The director of posts and intelligence in Baghdad, ibn Khurdadbeh, writing in the last quarter of the ninth century, noted that the Rus (Scandinavian traders/settlers in Novgorod and Kiev) 'sometimes' took goods on camels from the Caspian Sea to Baghdad (Shepard 1995, 244–5). The production of plain-weave cloth in Baghdad was so well established that the word 'tabby' is believed to be a corruption of the name of a suburb of the city, *attabiy*, after 'Attab, great grandson of Omeyn (Collingwood 1982, 148). Plain-weave silk cloth was made there at least from the twelfth century.

How did the silk cloth come into Ireland?

In Viking times well-known trade routes ran from centres like Haithabu, Birka and Kaupang to the eastern Baltic, and then down through Novgorod and Kiev to Byzantium (Jankuhn 1982, 37 and 39). Another route from Scandinavian trading ports curved around the north of Scotland past Viking settlements and continued south to Dublin (Fig. 94). The presence of many hundreds of Hiberno-Norse coins (c. 997–c. 1030) in Scandinavia and of English coins in Dublin until the late 1020s or 1030s, including pre-Norman coins in Fishamble Street, are evidence of strong commercial exchanges (Wallace 1987, 208–15). In Byzantium the production of silks of different weaves was an imperial monopoly (Geijer 1979, 128 and 131), and the Byzantines believed that barbarians like the Vikings should be allowed access only to the poorer types of silk. It seems likely that the pieces being sewn into caps and worn as scarves by Dublin townspeople were such exports. Other finds in Fishamble Street and John's Lane of weft-faced compound twill silks from Byzantium strengthen the case further (Pritchard 1988, 158). Items from Novgorod and Kiev may well have made their way through the Baltic to Ireland at the time. Certainly, walnuts were being imported from the south up the river Dnieper to the Rus towns (Rybina 1992, 193–4). They have also been found in Dublin, although their source is not suggested as being the same (Geraghty 1996, 50).

As we have seen, the silk textiles have contemporary parallels in York, Lincoln and London. The specific similarities between the pattern, construction and raw materials of the caps from Dublin and York should represent strong cultural and trading links between these towns. The known historic ties between the Norse kingdoms of Dublin and York underline the connection. However, other trade routes ran overland across England and over the Irish Sea; Anglo-Saxon coins and other artefacts like carved ivory pieces found in Dublin show that there was trade with English merchants (Wallace 1984, 125–6; 1986, 208–13). Silks were found in tenth- and eleventh-century levels in Milk Street, London, strongly resembling the York, Lincoln and Dublin pieces (Pritchard 1984, 70). Since the same types of silk were being worn in those three towns, people must have been travelling and transporting goods between them whether the exchange mechanism used was trade or gifts.



Fig. 94. Map of the main trade routes in central, northern and eastern Europe during the Viking period (from Jankuhn 1982, 34, reproduced with kind permission of the Royal Society of Antiquaries of Ireland).

There were well-established travellers' routes from north to south. We know that silks from the eastern Mediterranean were being traded into Rome and through the Italian peninsula to northern Europe. Many Anglo-Saxon merchants visited the fairs at Pavia in northern Italy, where textiles were bought and sold (Dodwell 1982, 151). Irish clerics had travelled widely for many years; Columbanus established a monastery at Bobbio, not far from Pavia, in the seventh century. It seems that Irish influence continued there at least until the late eleventh century (Kenney 1929, 10, 516, 601, 619).

By the eleventh century the Christianised kings of Dublin and their entourages were making pilgrimages to Rome. Specific souvenirs like badges and pieces of green porphyry have been found in Dublin and are thought to have been carried home by pilgrims (Lynn 1985, 27–8). The *Annals* chronicle the visits there of King Sitric in AD 1028 and his son Olaf in AD 1034 (Lynn 1985, 50). It is very likely that pilgrims would bring home some luxury items like silk cloth as well as other goods.

The position of Dublin as a trading post in the widespread network of early medieval commerce is highlighted by the account of an expedition in the *Eyrebyggernes Saga* (N.M. Petersen, cited in Hald 1980, 123). This was made by the woman Thorgunn from

Dublin to Iceland in the summer of AD 1000. 'It is told that in the same summer Christianity was legalised in Iceland, a vessel arrived with people from Ireland and southerly islands, among them was a woman, Thorgunn, who had many valuable things on board. Fine bed linen is mentioned together with English sheets and a silk blanket and drapery and other items "so costly that nothing like it had been seen before".' It seems that trading vessels were plying between Viking settlements and taking onwards luxury goods to be sold at the end of the run in Iceland.

Little is known of the exchange mechanisms between the Viking settlers in Dublin and the inhabitants of the hinterland. Trading was certainly happening, perhaps in market areas just outside the Norse settlement. Doherty refers to a market in the twelfth century on what we now know as the Cornmarket in Dublin (Doherty 1980, 83). He also excerpts from the twelfth-century *Life of St Kevin* an allusion to a market held at Glendalough south of Dublin. In the *Oenach Carmain* text (§305), which describes the triennial fair of Carmun, it is said that there were three markets taking place over seven days, one of which is *margad mór na nGall ngrécach / i mbíd ór is arddétach* 'the great market of the Greek foreigners where were found gold and fine raiment/cloth' (Kelly 1997, 459). This suggests that luxury goods were traded independently of the Norse. It seems probable that the *arddétach* was silk cloth, some perhaps with gold threads, brought into Ireland by these Greek merchants who may have come from Byzantium.

Viking Age dress in Dublin

Since the discovery of the Dublin caps there has been discussion as to whether they were part of traditional Viking costume, perhaps being worn by women who also wore the pinafore dress with straps and full-sleeved shirt of the Scandinavian homelands. The best evidence for this would be if finds from Fishamble Street and John's Lane included examples of the typical oval brooches used to pin together the skirt and straps. No such artefacts were retrieved. However, the total lack of such brooches is not unexpected, since they were not found in the Viking Age excavations in York either (Owen-Crocker 1986, 147). Both Dublin and York were settlement sites. In areas of Scandinavian influence oval brooches have been found exclusively in graves, and usually not later than the tenth century, so their absence from settlement sites does not necessarily mean that they were not being worn. The ninth-century Viking Age cemetery material from Islandbridge and Kilmainham, Dublin, includes four pairs of oval brooches (Coffey and Armstrong 1910, 108, 119).

In a tenth-century burial from Kneep, near Valtos in the Isle of Lewis, a woman was buried wearing two oval brooches and a ringed pin. The presence of the pin pulls the dating towards the late tenth or possibly the early eleventh century (Batey 1987, 170). The Irish origin of ringed pins suggests that there were links with Ireland and, by inference, that the oval brooches may also have been worn by Hiberno-Norse women in the tenth century. It would be more appropriate to wear a cap or scarf with the skirt and oval brooches since, as we have seen, a large wimple would overlay the elaborately patterned brooches and so obscure them.

It is difficult to illustrate the style of dress that would have been worn with the small squarish cap; there are almost no contemporary representations of women with such headdresses. Another possibility is that the little caps were worn under a wimple and so are invisible on female figures depicted in Anglo-Saxon illuminated manuscripts and the embroidered Bayeux 'tapestry'. There is little concrete evidence for Irish dress at this time to establish whether such headdresses had local antecedents, although the vocabulary already noted shows that some kinds did exist. If the silk and fine wool caps were covered over with a wimple it is remarkable that they were so commonplace as to be worn as 'underwear'. It is more likely that they were displayed, since they were surely desirable objects that gave pleasure and perhaps status to the wearer. If they were not displayed, that would suggest an unexpected affluence among the Dublin townspeople even beyond what is known to have existed.

The scarves may have been worn as head coverings held in place with silver fillets or tablet-woven bands ornamented with silver or gold thread. Perhaps tablet-woven bands like those found at Fishamble Street and John's Lane (Pritchard 1988, 150–6) were also used as head-bands as they were at Birka at the same time (Geijer 1938, 146). It may

have been customary to wear several headcoverings together. For example, the tabby-weave cloth bands perhaps kept in place the rectangular headcloths as well as being worn on their own, and the caps themselves may have been worn under more ample coverings. The lack of linen remains does not mean that it was not readily available; indeed there may have been another whole range of linen headcoverings now totally lost.

In this context there was an interesting use of headcoverings on the island of Urk, north Holland, in the nineteenth century. There was a long tradition there that the women wore caps, bands and metal ornaments all at the one time. It was the custom to wear two under-bonnets, one black and one white, kept in place by pins. A wide red band then encircled the head twice, on which a narrow silver band was placed, decorated with little knobs and pins. Finally, a third white lace bonnet was placed over all (Bing and von Ueberfeldt 1978, pls 27 and 28). This fashion suggests the fascinating idea that it reflects an earlier similar multiple wearing of caps, bands, silver fillets and metal ornaments, whether at Dublin, Birka or other northern European settlements.

We do know that other headcoverings were used in Dublin. Seven hairnets of knotted silk were found in the excavations, as well as a piece of *sprang*, another kind of mesh made of silk, which might have been a headcovering. Plied and plaited silk cords were also retrieved (Pritchard 1988, 156). Any of these may have been worn with the caps, bands and scarves, or on their own. It seems that by the tenth century European folk-dress traditions of scarves, caps and bands were well established among the Hiberno-Norse of Dublin.

Although we do not yet have anything like a complete picture of Viking Age dress from the textile remains found in the Dublin excavations, some aspects have become clearer. Research on Danish Viking Age graves suggests links between people in positions of power and the presence of silk, of cloth dyed red and blue, and of gold and silver thread in woven narrow bands. It has been proposed that such fashions were influenced by the Byzantine court through Russian and Frankish aristocratic circles (Hedeager Krag 1998, 126–7). All these elements are seen in the Hiberno-Norse townspeople's headcoverings.

When assessing archaeological textiles a difference must be considered between clothes found in graves and those, as at Dublin, from a settlement site (Fig. 95 shows a reconstruction of the settlement in question). The artefacts from a grave form a static, perhaps solemn, grouping together of a person's belongings, whereas the day-to-day nature of finds from houses places items of dress in a more familial setting. Textiles from graves may have been selected to fit in with cultural or religious expectations. By contrast, the Dublin coloured silks, fine-weave wools and gold- and silver-enhanced tablet-woven bands were found among household debris, giving us a much more immediate sense of their use. It may be that here prince and merchant, housewife and artisan were closely linked in their daily life so that the ornaments of power were well distributed throughout the population.

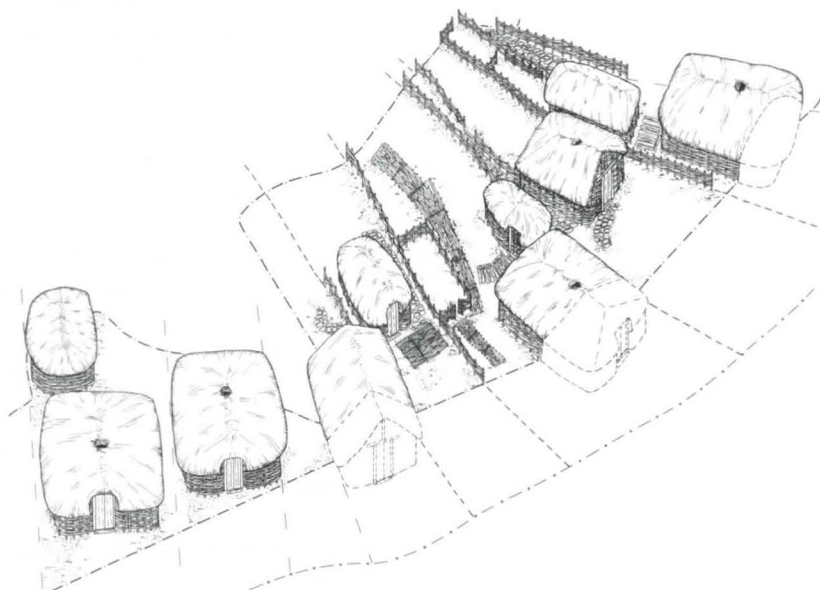


Fig. 95. Reconstruction of houses at level 7, Fishamble Street, Dublin (from Wallace 1992, Fig. 18).

Conclusions

Function of the textiles

The analysis confirmed that the primary use of most of the textiles was as headcoverings and headbands; five types could be identified. The results of the analysis of hair caught in the textiles show that some pieces not immediately recognisable as such were also headcoverings. The lightweight open-weave cloth was unsuitable for heavy wear or strain. The fabrics did not show wear marks typical of other garments nor were they shaped like pattern pieces of clothes.

The length of the textiles surviving is too short to have been draped as shoulder-length wimples. Possibly the headbands held the rectangular scarves in place. Archaeological and ethnographic evidence suggests that the pieces could have been worn individually or combined with each other.

There is an accepted pattern in which both the wool and the silk caps were made. A wide range of sewing techniques, used mainly in a skilled fashion, has been employed in the make-up of the pieces.

Construction of headcoverings

All the wool scarves, bands and caps were woven from the same type of narrow-width, lightweight cloth. Some are the same width, but some scarves are made from wider loom-pieces than those used for caps. Therefore, although wider material was available, it was not used for making caps. Silk cloth was cut down to the preferred width of the wool caps. The fact that imported silk cloth was altered in this way suggests that the wool pattern type is the original mode of construction. Since wool was an indigenous product and silk an import, the wool cloth must dictate the original pattern. This strengthens the hypothesis that the caps have a northern European origin. Had the silk examples been uncut loom-pieces, and the wool caps cut down to match their width, the fashion for the caps might have been imported along with the silk material. The numbers of caps surviving from fourteen dwelling sites and a pit in Dublin suggest a widely accepted fashion among the townspeople.

Use of caps

In principle the close-fitting caps may have been worn by men, women or children, but most of the evidence suggests that they were worn by women as part of their dress. It is possible that they were worn inside a further headcovering, such as a linen wimple. The materials seem unsuitable for hard wear. Although not commonly illustrated, enough evidence is available from illuminated manuscripts, literary accounts and excavations to show that caps, scarves and headbands were not unusual in the tenth, eleventh and twelfth centuries. The caps were in use for 300 years as, probably, were the scarves and bands. Given this long period of time, it is not surprising to see in the thirteenth century a widespread flowering of the wearing of little caps by both men and women. This ubiquitous item of dress is then found throughout Europe and is a more shapely version of the Hiberno-Norse caps.

The wool textiles were well spun and woven by an experienced hand. To achieve this standardisation, the artisans who produced yarn and cloth employed highly developed selection processes. Wool was carefully chosen from a large pool of raw material, then spun by skilled people. The fine yarn used would probably have been spun with a light spindle and whorl, the use of which required a high level of expertise. Regular, ample

supplies of good fleeces were needed to ensure that the necessary quantity and quality of wool were available to the spinners.

The origin of the wool is not yet established. Although sheep rearing was common by then in Ireland, it is not known whether yarn of the type, quality and quantity described above was being produced. It is clear from archaeological evidence that good-quality wool was being spun in the town, and that cloth was in all probability woven there. It is difficult to judge whether there were organised weaving workshops as there were in the later Middle Ages. However, specialised domestic workshops attached to well-to-do households would not be unusual in the town. This pattern is being recognised in Viking Age western Norway, where the skilled work of women in the production of textiles was of economic importance (Mortensen 1998, 193–4).

It is of course possible that the wool cloth or yarn was imported from Scandinavia. Since the spinning of combed Z/Z yarn like that used for the Dublin open-weave tabbies was common practice in the Viking era, a northern European source cannot be ruled out (Bender Jørgensen 1986, 358–60; Wincott Heckett 1997, 749).

At present, few precisely comparable wool textiles are known in north-western Europe. The Dublin open light wool tabbies are an important addition to the corpus of material for this period.

The silk textiles are plain weave but woven from very fine yarn, which produced a good-quality cloth. The yarn is well produced, and the cloth well woven. Three combinations of yarn—Z/Z twist, Z/no twist and no twist in either system—were used; these cloth types are widely found in Europe in the medieval period. The silks may have been made in Byzantium, with Baghdad or another near-eastern city also possibilities. Although none of the wool pieces showed evidence of dyeing, four silk textiles showed positive signs of either lichen purple, alizarin (red) or ?indigotin (blue). It is possible that other pieces were also dyed. Measurements on the Munsell Color Charts showed hue, value and chroma mainly in the Yellow Red range, with a minority of silk pieces in the Yellow range.

The size of the pieces may have been determined by the technical limitations of looms available, by the culturally formed choice of the weaver or by some widely accepted measurement like the ell. The caps, scarves and bands belong to the group of garments made from rectangular, individually sized and produced loom-pieces. They may have been held in place by a knot, pins, fillets or cloth bands; or shaped into caps by stitching. Such pieces have a long history and use. The similarities between the silk caps from Dublin and those from York and Lincoln are striking and must represent interaction and a cultural relationship between these towns. Dublin is, however, the only site in which the wool caps have been found; none has been found in Scandinavia. The Viking Age settlement in Waterford yielded rich finds of textiles but no comparable pieces of tabby-weave silk or wool. In some cases the Z-spun yarn used in the wool cloth is a fine combed, glossy type reminiscent of that used for the Dublin wool caps, scarves and bands, suggesting that this particular yarn type, in differing diameters, was widely used (Wincott Heckett 1997, 744, 749).

Dating

The textiles range in date from the first years of the tenth century to the mid- to late twelfth century, representing 300 years of use. The latest date shows that the fashion for wearing the distinctively shaped lightweight cap continued until the end of the Viking Age settlement, and perhaps beyond. The quality of the late example is as fine as any that came earlier in the sequence. These finds give us a fascinating glimpse of the diverse and complex range of styles and materials chosen for personal use in an early medieval town.

There is an important consequence of the retrieval of the caps, scarves and bands. Until discovered in the Dublin, York and Lincoln excavations these headcoverings were unknown. Small pieces of cloth that had survived in burials suggested some kind of veil or cap, but none was complete. It had been thought that Viking women went bareheaded, or perhaps wore veils or wimples as Saxon or Frankish women did. This view was supported by contemporary iconography. The textile finds emphasise how archaeology can produce new evidence of particular artefacts that were previously quite unknown.

The importance of Dublin

The use of imported silk for headcoverings emphasises the prosperity of the Viking Age inhabitants and the essentially trading character of the settlement. A short row of houses provides impressive evidence from the remnants of daily life mislaid or discarded after long use. The profusion and quality of the textiles show clearly the comfortable, assured living standards enjoyed by some Hiberno-Norse townspeople.

TABLE 1—Scarves of wool and silk of Z/Z yarn.

Museum number	Fibre	Estimated original dimensions (mm)		Length	Width	Diameter of yarn (mm)		Threads per cm		Fringes	Colour (Munsell)		
		Warp	Weft			Warp	Weft	Warp	Weft		Hue value	Chroma	Verbal
DHC1	Wool	480 (min.)	180	—	✓ ^a	0.16–0.21	0.19–0.21	15–22	11–14	1	5YR	2.5/2	Dark reddish brown
DHC2	Wool	520 (min.)	217 (min.)	—	—	0.09–0.15	0.13–0.14	24–26	15–18	1	7.5YR	3/2	Dark brown
DHC3	Wool	130 (min.)	170 (min.)	—	—	0.20–0.23	0.19–0.21	13–18	9–11	1	5YR	2.5/2	Dark reddish brown
DHC4	Wool	200 (min.)	150	—	✓	0.17–0.20	0.18–0.20	19–25	11–12	1	5YR	3/2	Dark reddish brown
DHC5	Wool	250 (min.)	210	—	✓	0.17–0.19	0.20–0.21	13–18	11–14	1	2.5YR	2.5/2	Very dusky red
DHC6	Wool	450 (min.)	240	—	✓	0.19–0.20	0.15–0.18	15–22	9–10	2 ^b	2.5YR	2.5/2	Very dusky red
DHC7	Wool	330 (min.)	230	—	✓?	0.24–0.26	0.22–0.27	14–16	9–10	1	5YR	2.5/2	Dark reddish brown
DHC8	Silk	610	220	✓	✓	0.09–0.10	0.08–0.09	22–25	16–18	2	5YR	4/3	Reddish brown
DHC9	Silk	380 (min.)	175	—	✓	0.10–0.11	0.08–0.09	19–25	16–18	1	5YR	4/3	Reddish brown
DHC10	Silk	595	210–230	✓	✓	0.12–0.17	0.16–0.19	16–21	12–15	2	2.5YR	3/4	Dark reddish brown
DHC11	Silk	700	210	✓	✓	0.13–0.18	0.15–0.17	19–21	13–16	2	2.5YR	2.5/2	Very dusky red
DHC12	Silk	670 (min.)	210–240	—	✓	0.14–0.17	0.20–0.26	17–19	11–16	2 ^b	10YR	4/6	Dark yellowish brown
DHC13	Silk	380 (min.)	150	—	✓	0.12–0.14	0.09–0.14	30–41	19–32	—	5YR	4/3	Reddish brown
DHC14*	Wool	105	105	—	—	0.15–0.18	0.14–0.19	14–16	11–15	1	5YR	2.5/2	Dark reddish brown
DHC15*	Wool	250 (min.)	240 (min.)	—	—	0.16–0.21	0.15–0.19	11–13	11–12	1?	2.5YR	2.5/2	Very dusky red
DHC16 ^c	Wool	220	170	—	—	0.18–0.26	0.20–0.25	18–20	16–20	—	5YR	3/2	Dark reddish brown
DHC17	Silk	870	240	✓	✓	0.28–0.35	0.19–0.31	15–23	10–12	—	2.5YR	4/4	Reddish brown

^a Where the length or width of a piece is established, it is possible to make inferences about its function. Thus, the symbol '✓' in the 'length' and 'width' columns indicates a scarf fragment.

^b Both fringes present but middle section missing.

^c Warp and weft not identified, but yarn diameters and thread densities correspond to known scarf pieces.

* Scarf type fragment.

TABLE 2—Bands of wool and silk.

Museum number	Fibre	Estimated original dimensions (mm)		Length	Width	Diameter of yarn (mm)		Threads per cm		Hem	Fringes	Colour (Munsell)		
		Warp	Weft			Warp	Weft	Warp	Weft			Hue value	Chroma	Verbal
DHC18	Wool	385	160	✓*	✓	0.23–0.29	0.26–0.29	12–17	11–13	2	2	5YR	2.5/1	Black
DHC19	Wool	300 (min.)	90 (min.)	—	—	0.16–0.18	0.18–0.21	14–19	11–13	1	1	N	2/0	Black
DHC20	Wool	280 (min.)	85 (min.)	—	✓	0.19–0.21	0.18–0.26	11–15	12–16	1	1	5YR	2.5/1	Black
DHC21	Wool	385	120	✓	✓	0.24–0.27	0.24–0.25	11–17	11–17	2	1	N	2/0	Black
DHC22	Wool	250 (min.)	120	—	—	0.18–0.22	0.20–0.24	13–17	17–21	1	—	7.5YR	3/2	Dark brown
DHC23	Wool	350 (min.)	170	—	✓	0.20–0.28	0.21–0.26	11–15	11–13	2	2	5YR	3/1	Very dark grey
DHC24a	Silk	350	120	✓	✓	0.11	0.09	23–37	24–39	2	—	5YR	3/3	Dark reddish brown
DHC25	Silk	580 (min.)	100	—	✓	0.15–0.18	0.17–0.25	17–19	8–12	—	2	5YR	2.5/2	Dark reddish brown
DHC26	Silk	570 (min.)	80	—	✓	0.14–0.16	0.21–0.25	32–37	25–27	—	—	5YR	3/2	Dark reddish brown
DHC27a	Silk	20	230	—	—	0.11–0.12	0.45–0.50	38–49	19–24	1	—	10YR	5/3	Brown
DHC27b	Silk	65	160	—	—	0.11–0.12	0.45–0.50	38–49	19–24	—	—	10YR	5/3	Brown
DHC28a	Silk	120	20	—	—	0.29–0.31	0.12–0.18	36	30–32	—	—	10YR	5/4	Yellowish brown
DHC28b	Silk	100	120	—	—	0.29–0.31	0.12–0.18	36	30–32	—	—	10YR	5/4	Yellowish brown
DHC28c	Silk	160	35	—	—	0.29–0.31	0.12–0.18	36	30–32	—	—	10YR	5/4	Yellowish brown
DHC29	Wool	300	145	—	✓	0.15–0.19	0.15–0.17	15–19	13–15	—	—	5YR	2.5/2	Dark reddish brown

* Where the length or width of a piece is established, it is possible to make inferences about its function. Thus, the symbol '✓' in the 'length' and 'width' columns indicates a possible scarf fragment.

TABLE 3—Caps and possible caps of wool and silk.

Museum number	Fibre	Estimated original dimensions (mm)		Twist direction Warp/Weft	Degree of twist		Diameter of yarn (mm)		Threads per cm		Selvedges	Selvedge loops (mm)	Colour (Munsell)		
		Warp	Weft		Warp	Weft	Warp	Weft	Warp	Weft			Hue value	Chroma	Verbal
DHC30	Wool	440	180	Z/Z	M	L	0.24–0.25	0.18–0.21	14–16	15–17	1	2	5YR	2.5/2	Dark reddish brown
DHC31	Wool	400	160	Z/Z	L	L	0.19–0.21	0.21–0.23	14–20	15–16	2	2	5YR	2.5/2	Dark reddish brown
DHC32	Wool	460	180	Z/Z	L	L	0.22–0.25	0.17–0.21	19–22	9–13	2	1–2	5YR	2.5/1	Dark reddish brown
DHC33	Wool	490	185	Z/Z	L	L	0.25–0.34	0.26–0.29	12–15	9–11	2?	—	10YR	2/2	Very dark brown
DHC34	Wool	380	140	Z/Z	ML	L	0.23–0.25	0.19–0.23	16–17	10–12	1	2	5YR	2.5/1	Black
DHC35	Wool	460	165	Z/Z	L	M	0.18–0.19	0.19–0.23	16–21	10–13	2	1–2	10YR	2/2	Very dark brown
DHC36	Wool	480	150	Z/Z	L	M	0.20–0.23	0.18–0.24	18–23	14–20	2	3	5YR	3/4	Dark reddish brown
DHC37	Silk	390	178	Z/—	L	—	0.12–0.17	0.30–0.32	19–21	22–27	1	—	2.5Y	5/4	Light olive brown
DHC38*	Silk	210	150	Z/—	ML	—	0.36–0.39	0.22–0.24	32–36	21–24	—	—	2.5Y	4/4	Olive brown
DHC39	Silk	480	168	Z/—	L	—	0.10–0.18	0.38–0.50	19–23	19–27	—	—	10YR	3/4	Dark yellowish brown
DHC40	Silk	540	160	Z/Z	L	L	0.13–0.16	0.14–0.15	30–34	19–25	1	—	5YR	4/2	Dark reddish grey
DHC41*	Wool	120	130	Z/Z	L	L	0.26–0.29	0.24–0.26	14–16	8–9	1	—	5YR	2.5/2	Dark reddish brown
DHC42*	Wool	100	48	Z/Z	ML	ML	0.31–0.34	0.20–0.26	14–16	11–14	1	1	5YR	2.5/2	Dark reddish brown
DHC43*	Wool	500	c. 150	Z/Z	ML	M	0.24–0.26	0.24–0.27	12–14	9–12	2?	—	10YR	2/2	Very dark brown
DHC44	Wool	520	c. 170	Z/Z	M	ML	0.22–0.27	0.27–0.31	14–15	9–10	2	—	7.5YR	3/2	Dark brown
DHC45	Wool	320	65	Z/Z	M	M	0.23	0.30	c. 10	8–9	1	—	5YR	2.5/1	Black

* Possible caps/cap fragments

L = Loose

M = Medium

TABLE 4—Sill

	<i>Dublin</i> <i>DHC37</i> <i>Fishamble Street</i>	<i>Dublin</i> <i>DHC39</i> <i>Fishamble Street</i>	<i>York</i> ⁺ <i>1372</i> <i>Coppergate</i>	<i>York</i> [*] <i>651</i> <i>Coppergate</i>	<i>Lincoln</i> [*] <i>Unnumbered</i> <i>Saltergate</i>
Dimensions (mm)	390 × 178	480 × 168	590 × 180	270 × 170/180	450 × 180
Weave	Tabby	Tabby	Tabby	Tabby	Tabby
Colour	Light olive brown	Dark yellowish brown	Golden brown	Golden yellow	Darkened golden yellow
Warp per cm	19–21	19–23	24–25	c. 22–24	c. 22
	Z-twist	Z-twist	Z-twist	Z-twist	Z-twist
Weft per cm	22–27	19–27	c. 19–20	c. 18–20	c. 20–24
	No twist	No twist	No twist	No twist	No twist
Selvedge	One; 39 paired warp ends for 15mm	One (on patch); erratic grouping of 41 pairs, 1 single, 3 sets of 4 warp ends, reinforced warping for 10mm	One; c. 40 paired warp ends	One; c. 26–28 per cm, paired warp ends for 14mm	One; c. 24–28 per cm, paired warp ends for 15mm
Dating (century)	Mid-/late 10th	Mid-10th	c. 975AD	Early 10th	Early 10th

⁺ After Walton 1961

^{*} After Muthesius

TABLE 5—Short catalogue of wool tabbies of Z/Z yarn.

Museum number	Wa/We known	Dimensions (mm) actual		Dimensions (mm) estimated original		Degree of spin		Diameter of yarn (mm)		Threads per cm		Selvedge	Selvedge loops (mm)
		Length	Width	Length	Width	Warp	Weft	Warp	Weft	Warp	Weft		
DHC1	✓	480	180	480 (min.)	180	L	L	0.16–0.21	0.19–0.21	15–22	11–14	2	2–4
DHC2	✓	160	217 (1)	520	217	L	L	0.09–0.15	0.13–0.14	24–26	15–18	1	3
DHC3	✓	100	110 (1)	130 (min.)	170 (min.)	L	L	0.20–0.23	0.19–0.21	13–18	9–11	1	1–2
DHC4	✓	200	150	200 (min.)	150	L	T	0.17–0.20	0.18–0.20	19–25	11–12	2	2
DHC5	✓	250	210	250 (min.)	210	L	L	0.17–0.19	0.20–0.21	13–18	11–14	2	3
DHC6	✓	200	240 (1)	450 (min.)	240 (min.)	ML	ML	0.19–0.20	0.15–0.18	15–22	9–10	2	2
DHC7	✓	330	230	330 (min.)	230 (min.)	L	MT	0.24–0.26	0.22–0.27	14–16	9–10	2	—
DHC14	—	105	105 (1)			L	L	0.15–0.18	0.14–0.19	14–16	11–15	—	—
DHC15	✓	250	240	250 (min.)	240	L	L	0.16–0.21	0.15–0.19	11–13	11–12	1	4
DHC16	—	220	170 (1)	220 (min.)	170 (min.)	ML	ML	0.18–0.26	0.20–0.25	18–20	16–20	1?	—
DHC18	✓	385	160	385	160*	L	L	0.23–0.29	0.26–0.29	12–17	11–13	2	—
DHC19	✓	190	90 (1)	300	90*	ML	ML	0.16–0.18	0.18–0.21	14–19	11–13	2?	1?
DHC20	✓	185	85 (1)	280 (min.)	85	L	ML	0.19–0.21	0.18–0.26	11–15	12–16	2	—
DHC21	✓	385	120	385	120*	M	M	0.24–0.27	0.24–0.25	11–17	11–17	2	—
DHC22	✓	90	120 (1)	250 (min.)	120 (min.)	L	L	0.18–0.22	0.20–0.24	13–17	17–21	2	PW
DHC23	✓	290	170 (1)	350	170	M	ML	0.20–0.28	0.21–0.26	11–15	11–13	2	—
DHC29	✓	300	145	300 (min.)	145 (min.)	M	M	0.15–0.19	0.15–0.17	15–19	13–15	2	2
DHC30	✓	210	170	440 (min.)	180	M	L	0.24–0.25	0.18–0.21	14–16	15–17	1	2 (PW)
DHC31	✓	380	160 (1)	400 (min.)	160	L	L	0.19–0.21	0.21–0.23	14–20	15–16	2	2
DHC32a	✓	210	150	460 (min.)	180*	L	L	0.22–0.25	0.17–0.21	19–22	9–13	2	1–2
DHC32b	—	138	c. 80			L	L	0.21	0.17	14–20	11–15	—	—
DHC33	✓	350	170	490 (min.)	185*	L	L	0.25–0.34	0.26–0.29	12–15	9–11	2?	PW
DHC34	✓	180	120 (1)	380 (min.)	140 (min.)	ML	L	0.23–0.25	0.19–0.23	16–17	10–12	1	2
DHC35	✓	230	200 (1)	460	165*	L	M	0.18–0.19	0.19–0.23	16–21	10–13	2	1–2
DHC36	✓	240	145	480	150	L	M	0.20–0.23	0.18–0.24	18–23	14–20	2	3
DHC41	✓	120	50 (1)	120 (min.)	130 (min.)	L	L	0.26–0.29	0.24–0.26	14–16	8–9	1	?
DHC42	✓	100	48			ML	ML	0.31–0.34	0.20–0.26	14–16	11–14	1	1
DHC43	✓	260	130 (1)	500 (min.)	150	ML	M	0.24–0.26	0.24–0.27	12–14	9–12	2?	PW
DHC44	✓	276	70 (1)	520	170	M	ML	0.26	0.24–0.29	14–15	9–10	2	—
DHC45	✓	140	100	320 (min.)	65 (min.)	M	M	0.23	0.30	c. 10	8–9	1	—
DHC46	✓	60	255			L	L	0.20–0.24	0.23–0.26	14–17	13–16	1	2
DHC48	✓	74	44			L	M	0.21–0.26	0.32–0.34	18–20	15–16	1	2
DHC49	—	135	120 (1)			L	L	0.29–0.34	0.24–0.28	12–13	10–12	—	—
DHC50	✓	65	50			M	M	0.25–0.28	0.21–0.25	15	15	2+	—
DHC51	✓	170	80 (1)	230 (min.)	160 (min.)	T	MT	0.19–0.23	0.19–0.21	13–19	13–15	2+	—
DHC52	✓	193	100			L	L	0.22–0.23	0.18–0.25	15–18	11–13	1	—
DHC53	—	110	30			M	M	0.23–0.24	0.22–0.25	15–20	14–15	—	—
DHC54	—	130	58			L	L	0.17–0.21	0.19–0.20	10–13	10–13	—	—
DHC55	✓	120	60 (1)			L	L	0.22–0.23	0.22–0.23	12–16	11–15	2+	c. 1.5
DHC56	✓	80	150 (1)	200	160	M	ML	0.35–0.37	0.24–0.27	12–16	8–13	3+	PW
DHC57	—	100	40			ML	ML	0.18–0.21	0.17–0.23	15–18	13–15	—	—

(1) = Largest piece; L = Loose; M = Medium; T = Tight; PW = Paired warps at selvedge; * Complete pieces or original dimensions established; + Selvedges present on more than one cloth piece.

TABLE 6—Wool cloth with tasselled fringes.

<i>Museum number</i>	<i>Length of fringe (mm)</i>		<i>Number of threads in tassel</i>	<i>Details of construction</i>
	<i>End 1</i>	<i>End 2</i>		
DHC1	35	—	8–16	8–16 warp ends S-plied into tassels
DHC2	55–65*	—	24	2, 4, 6 or 8 warp ends S-plied, then c. 5 sets knotted; below knot pairs of warp ends hang loose
DHC3	55–65*	—	40	4 warp ends in each set are S-plied 2×2, then 5 sets of 2×2 are S-cabled
DHC4	20	—	c. 20	c. 20 warp ends per tassel but due to poor condition only bare traces of plying
DHC5	70*	—	16–20	Either 1 pair or 2 pairs of warp ends S-plied, then 2×2 S-cabled pairs with 2×2 sets until either 16 or 20 individual ends create 'corkscrew' effect
DHC6	c. 60*	c. 30*	36–72	End 1: 6 or 12 threads S-plied, then these S-cabled in sets of 6; also 6 sets plaited at one corner
DHC7	50*	—	c. 20	c. 5 sets of 4 S-plied threads then S-cabled sets of c. 20 threads
DHC14	30	—	16	2 warp ends S-plied, then 2×2 sets S-cabled and lastly 4×4 sets S-corded
DHC15	?	—	—	One possible tassel
DHC18	—*	—	—	Fringe visible under hemmed ends but not analysed because sewn into hems
DHC19	45	—	c. 16	c. 16 threads S-plied into each tassel
DHC20	20	—	10	10 threads S-plied into each tassel
DHC21	30–40	—	4–16	4–16 threads S-plied and sewn into hem
DHC23	30	—	c. 15–16	c. 15–16 threads S-plied and sewn into hem at end 1; end 2 not analysed because sewn into hem
DHC41	—	—	—	Fringe visible under hemmed end but not analysed because sewn into hem

* Looped warp ends identified.

TABLE 7—Cords on wool textiles.

<i>Museum number</i>	<i>Construction</i>	<i>Yarn type</i>	<i>Diameter</i>	<i>Colour</i>
DHC22	Z-spun, 2 S-plied	Woollen	1.5–2mm	Very dark brown
DHC30	Z-spun, 2 S-plied × 3, plaited	Combed	3mm	Black
DHC33	Z-spun, 2 S-plied × 6, Z-cabled	Combed	5mm	Very dark brown
DHC51	Z-spun, 2 Z-plied, 2 S-cabled, 2 Z-corded	Combed	2mm	Dark brown

TABLE 8—Short catalogue of silk tabbies of Z/Z twist thread.

<i>Museum number</i>	<i>Actual dimensions (mm)</i>		<i>Estimated original dimensions (mm)</i>		<i>Degree of spin</i>		<i>Crêpe type yarn</i>	<i>Diameter of yarn (mm)</i>		<i>Threads per cm</i>		<i>Selvedge</i>	<i>Selvedge loops (mm)</i>
	<i>Length</i>	<i>Width</i>	<i>Length</i>	<i>Width</i>	<i>Warp</i>	<i>Weft</i>		<i>Warp</i>	<i>Weft</i>	<i>Warp</i>	<i>Weft</i>		
DHC8	610	220 (1)	610	220	VL	VL	✓	0.09–0.10	0.08–0.09	22–25	16–18	2	4
DHC9	380	175	380	175	L	L	✓	0.10–0.11	0.08–0.09	19–25	16–18	2	4
DHC10	595	210–230	595	210–230	L	M	✓	0.12–0.17	0.16–0.19	16–21	12–15	2	2
DHC11	700	210	700	210	MT	ML	✓	0.13–0.18	0.15–0.17	19–21	13–16	2	2–4
DHC12	260 (1)	240 (1)	670	210–240	L	VL	—	0.14–0.17	0.20–0.26	17–19	11–16	2	c. 2–3
DHC13	270 (1)	150 (1)	380	150	L	L	✓	0.12–0.14	0.09–0.14	30–41	19–32	2	1
DHC17	840	240 (1)	870	240	VL	VL	—	0.28–0.35	0.19–0.31	15–23	10–12	2	PW
DHC24	350	120	350	120	LMT	LMT	✓	0.11	0.09	23–37	24–39	2	3
DHC25	220	90 (1)	580	100	L	L	—	0.15–0.18	0.17–0.25	17–19	8–12	2?	c. 3
DHC26	570	80	570	80	L	ML	—	0.14–0.16	0.21–0.25	32–37	25–27	2	—
DHC40	530	160 (1)	540	160	L	L	—	0.13–0.16	0.14–0.15	30–34	19–25	1	—

(1) = Largest piece

L = Loose

M = Medium

T = Tight

VL = Very loose

PW = Paired warps at selvedge

TABLE 9—Short catalogue of silk tabbies of Z/no twist thread.

Museum number	Warp/Weft known	Actual dimensions (mm)		Estimated original dimensions (mm)		Degree of spin		Diameter of yarn (mm)		Threads per cm		Selvedge	Selvedge loops (mm)
		Length	Width	Length	Width	Warp	Weft	Warp	Weft	Warp	Weft		
DHC37	✓	170	170 (1)	390	178	L	—	0.12–0.17	0.30–0.32	19–21	22–27	1	—
DHC38a	—	145	150	210	150	ML	—	0.36–0.39	0.22–0.24	32–36	21–24	—	—
DHC38b	✓	70	75	—	—	L	—	0.11–0.16	0.33–0.39	23–29	25–33	1	—
DHC38c	—	40	30	—	—	L	—	0.10	0.18	27–29	40–49	—	—
DHC38d	—	40	30	—	—	L	—	c. 0.10	0.18	28–30	43–48	—	—
DHC39a	—	360	155	480	168	L	—	0.10–0.18	0.38–0.50	19–23	19–27	—	—
DHC39b	✓	45	60	—	—	L	—	0.15	0.45–1.00	20–25	21–22	1	—
DHC39c	—	33	50	—	—	L	—	0.16	0.62	21–22	13–15	—	—
DHC47	✓	40	250	—	—	L	—	0.05–0.13	0.30–0.58	17–20	24–27	1	—
DHC58	—	190	270	—	—	M	—	0.15–0.19	0.10–0.45	24–31	26–32	—	—
DHC59	✓	305	210	—	—	M	—	0.12–0.15	0.17–0.25	28–33	26–31	1	—
DHC60	—	125	140	—	—	L	—	0.09–0.15	0.16–0.21	32–37	41–50	—	—

L = Loose

M = Medium

TABLE 10—Short catalogue of silk tabbies of no twist thread.

Museum number	Warp/Weft known	Actual dimensions (mm)		Estimated original dimensions (mm)		Degree of spin		Diameter of yarn (mm)		Threads per cm		Selvedge	Selvedge loops (mm)
		Length	Width	Length	Width	Warp	Weft	Warp	Weft	Warp	Weft		
DHC27a	✓	20	230	—	—	—	—	0.11–0.12	0.45–0.50	38–49	19–24	1	—
DHC27b	✓	65	160	—	—	—	—	0.11–0.12	0.45–0.50	38–49	19–24	1	—
DHC28a	—	120	20	—	—	—	—	0.29–0.31	0.12–0.18	36	30–32	—	—
DHC28b	—	100	120	—	—	—	—	0.29–0.31	0.12–0.18	36	30–32	—	—
DHC28c	—	160	35	—	—	—	—	0.29–0.31	0.12–0.18	36	30–32	—	—
DHC38e	—	45	25	—	—	—	—	c. 0.15	c. 0.25	42	22–26	—	—
DHC61a	—	70	45	—	—	—	—	0.13–0.17	0.15–0.18	48–58	11–14	—	—
DHC61b	—	70	17	—	—	—	—	0.13–0.17	0.15–0.18	48–58	11–14	—	—

TABLE 11—Variations in reinforced selvedge bands on silk cloth.

Museum number	Direction of twist	Frequency of warp ends and width of selvedge bands (mm)	Frequency per 10mm of warp ends in main weave	Diameter of warp ends in selvedge band (mm)	Diameter of yarn in main weave (mm)	
					Warp	Weft
DHC11	Z/Z	28 singles in 4mm	19–21	0.13–0.18	0.13–0.18	0.15–0.17
DHC25	Z/Z	20 singles in 4mm	17–19	0.15–0.18	0.15–0.18	0.17–0.25
DHC27	—/—	47 singles in 15mm	38–49	0.45–0.50	0.11–0.12	0.45–0.50
DHC37	Z/—	39 pairs in 15mm	19–21	0.12–0.17	0.12–0.17	0.30–0.32
DHC38b	Z/—	c. 74 singles in 18mm	23–29	0.33–0.39	0.11–0.16	0.33–0.39
DHC39b	Z/—	Erratic warping for 10mm, 23×2, 7×2, 1×4, 1×2, 1, 1×4, 10×2, 1×4	20–25	0.15	0.15	0.45–1.00
DHC40	Z/Z	39 pairs in 14mm	30–34	0.13–0.16	0.13–0.16	0.14–0.15
DHC47	Z/—	37 pairs in 5mm	17–20	0.05–0.13	0.05–0.13	0.30–0.58
DHC59b	Z/—	40 pairs in 10mm	29–33	0.12–0.15	0.12–0.15	0.17–0.25

TABLE 12—Z/Z Silk cloth with tasselled fringes.

Museum number	Length of fringe (mm)		Warp loops		Number of threads in tassel	Details of construction
	End 1	End 2	End 1	End 2		
DHC8	20	50	✓	✓	24–40	In one case 16 paired S-plied warp ends together and S-cabled; very poor condition
DHC9	c. 20	—	—	—	c. 20–24	Very poor condition impedes analysis
DHC10	c. 30	c. 60	✓	✓	End 1: 22–48 End 2: 10–24	Paired warp ends S-plied, then S-cabled again in sets of 11–24 pairs at end 1, and of 5–12 pairs at end 2
DHC11	c. 60	c. 100	✓	?	End 2: 32–40	Pairs of 16–20 warp ends Z-plied, then two sets of pairs of 16–20 S-cabled for 80mm, then knotted and last 20mm left to fall loose
DHC12	40–50	70–80	✓	?	36–48	Each pair of ends S-plied, then 9–12 S-cabled in sets, then 2 sets of these S-cabled to form tassel
DHC25	c. 45	c. 45	—	—	16–40	5 sets of paired warp ends are S-plied and then 4 sets of these S-cabled so that tassel consists of 40 threads; also tassel of 14 warp threads S-plied into single tassel; fringe in poor condition

TABLE 13—Details of sewing on wool pieces by types of hem and thread used.

Museum number	Depth of hem (mm)				Type of thread				Diameter of thread (mm)				Colour of thread				Number of stitches per cm				Size of stitch (mm)			
	Rolled	Folded	Oversewn	Corded	R	F	O	C	R	F	O	C	R	F	O	C	R	F	O	C	R	F	O	C
DHC5	2 ⁺	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—
DHC18	5 ⁺	5×5*	—	—	NE	NE	—	—	NE	NE	—	—	NE	NE	—	—	NE	NE	—	—	NE	NE	—	—
DHC19	—	6×6*	X	—	—	W	W	—	—	1.0	1.0	—	—	B	B	—	—	c. 4	?	—	—	1-2	?	—
DHC20	—	5×5*	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—
DHC21	5*	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—
DHC22	—	5×5*	5 ⁺	—	—	NE	W	—	—	NE	1.0	—	—	NE	BL	—	—	NE	2	—	—	NE	1-2	—
DHC23	2 ⁺	5×5*	—	—	NE	W	—	—	NE	1.5	—	—	NE	B	—	—	NE	?	—	—	NE	?	—	—
DHC30	—	5×5*	—	3 ⁺	—	W	—	W	—	1	—	0.9-1	—	BL	—	BL	—	3-4	—	4	—	2	—	4
DHC31	2 ⁺	5×5*	X ⁺	—	S	S	S	—	0.8	0.8	0.5	—	OB	OB	OB	—	4.5	4	2	—	1	2	1	—
DHC32	1 ⁺	10×10*	25 ⁺	—	W	W	W	—	c. 1.0	c. 1.0	c. 1.0	—	DRB	DRB	DRB	—	7	1.5-2	2	—	2	3	0.75	—
DHC33	—	9×9*	X ⁺	c. 5 ⁺	—	W	W	W	—	1.0	1.0	c. 1.0	—	BL	BL	BL	—	3	?	3	—	2	?	6
DHC34	—	—	15 ⁺	—	—	—	NE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DHC35	—	c. 5×5*	5 ⁺	—	—	W	W	—	—	1.0	1.0	—	—	BL	BL	—	—	2-3	c. 3	—	—	1-3	2	—
DHC36	—	5×5*	2 ⁺	—	—	W	W	—	—	1.0	1.0	—	—	B	LB	—	—	?	3-4	—	—	?	3	—
DHC41	2 ⁺	5×5*	—	—	W	NE	—	—	1.3	NE	—	—	BL	NE	—	—	2-3	NE	—	—	4	NE	—	—
DHC42	c. 2×2×2 ⁺	5×5*	—	—	S?	NE	—	—	1.0	NE	—	—	MB	NE	—	—	3	NE	—	—	1	NE	—	—
DHC44	1-2 ⁺	5×5*, c. 5 ⁺	—	—	W	W, W	—	—	1.0	c. 1.0, 1.0	—	—	DB	DB, DB	—	—	c. 4	c. 3, 3	—	—	2-3	2, c. 3	—	—
DHC45	—	c. 5×5*	X ⁺	—	—	W	W	—	—	c. 1.0	c. 1.0	—	—	BL	BL	—	—	3-4	2-3	—	—	3	2-3	—
DHC51	—	7×7*	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—
DHC53	—	5×5*	—	—	—	W	—	—	—	1.0	—	—	—	BL	—	—	—	2-8	—	—	—	1-3	—	—
DHC56	—	8×10*	X ⁺	—	—	W	W	—	—	2.0	2.0	—	—	BL	BL	—	—	3	3	—	—	3	3	—

B = Brown

BL = Black

C = Corded

DB = Dark brown

DRB = Dark reddish brown

F = Folded

LB = Light brown

MB = Mid-brown

NE = Non-existent

O = Oversewn

OB = Olive brown

R = Rolled

S = Silk

W = Wool

X = No depth of hem

⁺ Hem at selvedge

* Hem at top/bottom

TABLE 14—Details of sewing on silk pieces by types of hem and thread used.

Museum number	Depth of hem (mm)				Type of thread				Diameter of thread (mm)				Colour of thread				Number of stitches per cm				Size of stitch (mm)			
	<i>Rolled</i>	<i>Folded</i>	<i>Oversewn</i>	<i>Corded</i>	<i>R</i>	<i>F</i>	<i>O</i>	<i>C</i>	<i>R</i>	<i>F</i>	<i>O</i>	<i>C</i>	<i>R</i>	<i>F</i>	<i>O</i>	<i>C</i>	<i>R</i>	<i>F</i>	<i>O</i>	<i>C</i>	<i>R</i>	<i>F</i>	<i>O</i>	<i>C</i>
DHC17	—	4×4	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—
DHC24	—	5×5	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—
DHC27	—	2×2, 2×2	2×2	—	—	S	S	—	—	0.8	0.8	—	—	B	B	—	—	c. 4-5	—	—	—	1.5-2	c. 2	—
DHC37	—	2×2	X	—	—	S	S	—	—	1.0	1.0	—	—	DB	DB	—	—	3-4	5	—	—	c. 1-2	1	—
DHC38a	1-2	1-2×1-2, 2-3×2-3 ×2-3	c. 10	—	S	NE	S	—	0.4	NE	5.0	—	OB	NE	OB	—	4	5	5	—	3	NE	—	—
DHC38b	—	1-2	1.0	—	—	—	S	—	—	—	5.0	—	—	—	OB	—	—	—	5	—	—	—	NE	—
DHC38c	—	1-2×1-2	—	—	—	S	—	—	—	0.4	—	—	—	B	—	—	—	6	—	—	—	1-2	—	—
DHC38d	—	1-2×1-2	—	—	—	S	—	—	—	0.4	—	—	—	B	—	—	—	6	—	—	—	1-2	—	—
DHC38e	1-2	—	—	—	S	—	—	—	0.4	—	—	—	OB	—	—	—	4	—	—	—	3	—	—	—
DHC39a	—	3×3, 3	—	—	—	NE, W	—	—	—	NE, 1.0	—	—	—	NE, BL	—	—	—	NE, 4	—	—	—	NE, 2	—	—
DHC39c	—	3×3	—	—	—	W	—	—	—	0.4	—	—	—	BL	—	—	—	4	—	—	—	2	—	—
DHC40	1	2×2	—	—	NE	NE	—	—	NE	NE	—	—	NE	NE	—	—	NE	NE	—	—	NE	NE	—	—
DHC40e	—	—	3	—	—	—	NE	—	—	—	NE	—	—	—	NE	—	—	—	c. 4	—	—	—	NE	—
DHC59	2	4×4, 2×2	—	—	S	S, S	—	—	0.4	0.8, 0.8	—	—	DRB	DB, DB	—	—	3	3, 3-4	—	—	2	2, c. 2	—	—

B = Brown

BL = Black

C = Corded

DB = Dark brown

DRB = Dark reddish brown

F = Folded

NE = Non-existent

O = Oversewn

OB = Olive brown

R = Rolled

S = Silk

W = Wool

X = No depth of hem

Appendix 1

Catalogue conventions and methods of analysis

Explanation of catalogue headings

The pieces are numbered as Dublin Head Coverings (DHC) 1–61. Each catalogue entry begins with a verbal description. Below that, information is listed as to site, habitat, registration book number and context, as detailed on the National Museum of Ireland card attached to each textile and as in the Registration Books of the excavation. The date of the textile is then given. The textile is then catalogued by fibre, weave, colour, condition, dimensions, density of threads per centimetre, and absence or presence of selvedge and selvedge loops, fringes, dye and sewing. There is a section for comments. The information for the warp system is always given before that for the weft, and the measurement of length before that of width. Where the warp and weft systems cannot be established the information on each system is detailed under the headings 'System 1' and 'System 2'.

Where the width or length is marked as being *minimum* the original dimensions of the piece were wider or longer. Where possible an estimated original size is given. The length of the fringed pieces includes the fringe. Note that the dimensions given cannot be absolutely accurate because woven cloth can be stretched, and factors of distortion must be taken into account.

Each piece is drawn to scale (1 : 2 or 1 : 3) and shown as an annotated diagram with added detailed sketches. Where a cap is shown a further diagram demonstrates the estimated original size of the textile before sewing.

A broken line denotes a projected or extended edge to the textile. A line with a dot and dash represents a sewing line. A wavy line represents an ancient crease.

In every case the following analyses were completed:

1. Identification of fibre

This was carried out through microscopy. Identification of some fibres was provided by Ms Frances Pritchard of the Whitworth Museum, Manchester.

2. Identification of weave

This was checked under magnification.

3. Coding of actual colour

This was carried out on the Munsell Color Charts to establish an objectively defined basis for comparison within the sample and with other textiles (Sinclair 1982, 7) (see Appendix 4).

Since the textiles had been recovered from wet soil and had been subject to staining and presumably to changes of colour through leaching of minerals during their thousand years' deposition, it was felt that colour measuring would be appropriately carried out by the Soil Color sheets of the Munsell Charts. The definitions given below are excerpted from the Charts and from the US Department of Agriculture Handbook 18:

The arrangement [of the Charts] is by the three simple variables that combine to describe all colors and are known in the Munsell system as Hue, Value and Chroma. The Hue notation of a color indicates its relation to Red, Yellow, Green, Blue and Purple; the Value notation indicates its lightness; and the Chroma notation indicates its strength (or departure from a neutral of the same lightness). (Munsell Color Company Inc. 1988)

The use of the Color Charts provides a basis for comparison of dye analysis results with visual assessments of colour. It was felt that the use of the Munsell Code would overcome the subjectivity of personalised colour descriptions, and perhaps uncover significant colour variations not otherwise evident.

4. Assessment of condition

This was carried out to provide a frame of reference against which the technical details such as the numbers of threads per centimetre could be evaluated. Indications of areas of wear are given in the Catalogue.

5. Measurement of actual and assessment of original dimensions

The present dimensions of each textile were measured, and where the item consisted of several pieces an attempt was made to recreate the original dimensions. Where this was impossible a notation has been made in the diagram, and minimum length and width given. Measurements to establish the original size of the piece before sewing were also recorded where applicable. The measurement of textiles is necessarily inexact since the weave can be stretched and the cloth is not a rigidly defined entity.

6. Identification of spin direction and degree of spin

Each textile was examined to establish the spin direction and degree of spin in the yarn.

7. Number of threads per centimetre in warp and weft systems

It was possible to establish warp and weft systems in 83 per cent of the 41 wool pieces analysed and in 63 per cent of the 27 silk pieces. (These figures include composite pieces.) Where it was impossible the measurements have been described in the Catalogue as 'System 1' and 'System 2'. System 1 and System 2 have been arranged in the most likely accordance with other measurements in which warp and weft systems are known.

The calculation of threads to the centimetre was based on seven counts of threads in both warp and weft. Different parts of the textile were used in each count but the selection was not random. Considerable variation, due to wear and distortion undergone during the original use of the cloth and to deterioration during deposition, was obvious to the eye. The decision to select areas of good preservation to establish the density of threads per centimetre was taken, since it did not seem useful to choose areas where the weave was severely distorted or had deteriorated. The establishment of a realistic record of the numbers of threads per centimetre seemed more important than keeping to the principle of random selection. In instances where the preservation was universally poor this was noted in the catalogue. Where the item is a very small fragment the area available was inevitably restricted, so that the density of threads recorded may have less validity.

8. Measurement of yarn diameter in millimetres

The diameter of yarns was measured with a precision micrometer screw gauge. Yarn diameters are given in hundredths of a millimetre. Three measurements were taken in both warp and weft.

9. Identification of selvages and fringes

The existence of one or both selvages, of extended loops at the selvages and of fringed ends to pieces was noted and tabulated to provide a basis for consideration of techniques used in the production of these materials.

10. Analysis of dyes

Twenty-two dye samples were sent for analysis to Dr L. Masschelein of the Institut Royal du Patrimoine Artistique in Brussels, and five were tested by Ms Penelope Walton Rogers at the York Archaeological Trust Conservation Laboratory. The techniques employed by Dr Masschelein were thin-layer chromatography for dye analysis and X-ray fluorescence for the determination of metallic mordants. In the samples tested in York, dyes were extracted by various solvent systems (pyridine/water for indigotin and ethanol/10% aqueous sulphuric acid for the mordant dyes). Identification was based on the comparison

of the visible spectrum with those of known dyes. Details of techniques employed are given in Appendices 3.2 and 3.3.

11. Assessment of sewing

Types of sewing techniques were identified, and stitch length and frequency were measured and tabulated to establish levels of skill and to find out whether uniform sewing practices were current in the community. Yarn diameters of sewing thread were measured and tabulated.

Appendix 2

Methods of conservation

Before cataloguing and analysis began the textiles were washed in accordance with accepted laboratory practice to a level of conservation consistent with storage in normal museum conditions. Each piece was photographed and examined before washing. Some had already undergone preliminary washing before being received and so had been unfolded or straightened. Before conservation the textiles were examined under magnification of $\times 5$ to ascertain levels of robustness, and to check for any features that might be destroyed or altered in washing. In some instances it was noted that hairs were caught in the cloth and samples of these were taken for analysis. Some samples were taken for dye analysis.

The textiles were first washed in a dilute solution of Synperonic NDB detergent and de-ionised water and were then rinsed in as many changes of de-ionised water as were necessary to cleanse them. Where possible the residues from washing a particular sample were kept for future analysis. The fabrics were laid on low-acid paper on glass and lightly tamped with more low-acid paper to remove excess water. They were then weighted down with glass microscope slides, particularly in the area of the selvages. This last was to straighten the cloth without flattening the fibres and damaging the weave under too much pressure. The procedure facilitated the clear analysis of the construction of the selvedge areas. A value judgment was made as to which creases in the material might represent information on the construction and function of the textile and which had developed after deposition of the material.

Record sheets detailing the conservation processes carried out were completed for each sample. Copies have been made available to the National Museum of Ireland.

Appendix 3.1

Dyes and dyeing technology

Four silk pieces tested for dyestuffs gave positive results. DHC17 showed traces of a lichen that produces purple. It is impossible to isolate the exact species since no solvent has been found to define the other lichen dyes that may exist (Taylor 1982, 5); it may be *Ochrolechia tartarea*. Lichens have often been used as dyestuffs in northern Europe. The various lichens of the genera *Rocella* and *Lecanora* (*Ochrolechia*) grow widely throughout Europe, particularly in coastal regions.

DHC8 and DHC25 showed traces of alizarin, believed to be specific for the madder plant *Rubia tinctorum*. This has been established in the work of the Conservation Laboratory of the York Archaeological Trust, where alizarin has been found only in *R. tinctorum* and not in any of the other red-producing plants such as *R. peregrina* (wild madder) or *Galium verum* L. (Lady's Bedstraw) (Hall *et al.* 1984, 59). *Rubia tinctorum* is not native to Ireland, although *R. peregrina* is frequently found locally in the West (Webb 1977, 82). Madder is native to Asia Minor (Adrosko 1971, 21) but was grown in Anglo-Saxon England and by the Middle Ages as a commercial crop in France and the Low Countries (Hofenk de Graaff 1983, 76). Fragments of madder roots and red stained patches of earth in deposits associated with buildings were found in Viking York. These may have been grown locally or imported (Hall 1997, 1767–9). Dye tests on material from Anglo-Scandinavian York and Late Saxon London have shown traces of alizarin (Taylor 1982, 5; Pritchard 1984, 57). Wild madder, *R. peregrina*, was perhaps the dyestuff used on a wool cloth dated to the late seventh or eighth century AD from Deer Park Farms, Co. Antrim (Wincott Heckett forthcoming (b)). Madder seeds were found in Boho ringfort, Co. Fermanagh. Pot residues of pottery known as E ware (which was imported into Ireland until at least the seventh century), found at Teeshan Crannóg, Co. Antrim, contained cultivated madder probably specially imported from France (Edwards 1996, 70, 83).

DHC12 shows possible traces of indigotin (the chemical of the blue colour of woad), *Isatis tinctoria* L., and indigo, *Indigofera*. The former plant is a native of central and southern Europe and is listed as a prehistoric introduction into the British flora (Keble Martin 1965, pl. 10), but it does not appear in the Irish flora (Webb *et al.* 1977). One natural habitat of *Indigofera* is Asia, where it has been in use in India since antiquity. It might be that indigo was known to the Viking traders of northern Europe, whose commercial links extended down into the Near East, but it is likely to have been available only in small amounts. In the later Middle Ages the scarce quantities brought in by Venetian and Genoese traders were extremely expensive (Ponting 1981, 104). It is most unlikely to have been used in the Dublin textiles, since woad is a well-documented dye plant at the time.

Woad has been widely used and grown in northern Europe at least since the Iron Age (Ponting 1981, 179) and was a known cultivated crop in England and France from early medieval times. The eleventh-century Anglo-Saxon tract *Be gesceadwisan gerefan* 'On the competent reeve', which describes the duties of a good steward, requires that in the spring 'as soon as the weather is fine, the men set madder, linseed and woad' (Page 1970, 94). Woad pods were found at the Deer Park Farms site cited above (Lynn 1989, 197) and in the ninth-century Oseberg ship burial (Ingstad 1982, 87). Wool twill cloth from late Anglo-Saxon London was dyed with woad and then with lichen purple, and some others with woad and madder (Pritchard 1984, 58). There were woad pod remains from York and traces of indigotin in textiles from tenth-century levels there (Hall 1997, 1768).

Since the dyes used on the Dublin silks were so widely distributed in ancient times we cannot say exactly where the dyeing process took place. References are frequent in the vernacular literature to silks and other clothes of bright red, blue and green (Gantz 1983). Dyeing techniques were certainly known to the Irish. On the early Christian site on Inishkea (Henry 1952, 164) evidence was found for the preparation of dyestuffs or inks from the dog whelk, *Lapillus purpura*. The Book of Leinster and the Book of Lismore contain references to the craft of dyeing (Mahon 1982, 115–16). Kelly records

the many references to woad in Old Irish sources and states that it must have been a widely grown crop. He cites a legal commentary from about the twelfth century, in which the cultivation of woad seems to be a common procedure. There are fewer references to madder, but it may be inferred that the plant must have been relatively prevalent (Kelly 1997, 264–8).

However, the Dublin settlement of traders and merchants would have had no difficulties in importing dyestuffs. Although no traces of madder or woad have been identified from Fishamble Street, there were remains of tri-sulphide (known in the past as orpiment) in the form of ore fragments used as pigments in manuscripts (Geraghty 1996, 56). Sulphur, whose archaic name in English is brimstone, seems also to have been used in dyeing (Adrosko 1971, 118). The indigenous lichens would have been available locally, and also from the south of Europe.

A few of the plant remains found in Dublin may have been used to dye cloth; these were from yellow iris, imported walnuts and bilberries (Geraghty 1996, 21, 31, 40). It could be that the textiles were dyed in Dublin. Alternatively, the long tradition and advanced knowledge of dyestuffs in the Mediterranean world make it likely that imported items like the silks were processed where they were made.

No traces of dye were found in the wool samples. Traces of iron were detected in nine samples, and of ellagic acid in two. Dr Masschelein reported that these may indicate the presence of mordants in the case of iron and of tannin in the case of ellagic acid. The tannin might represent the use of bark or heartwood as a dye, or the use of nut-galls as a mordant. Oak-galls in particular were widely used in traditional methods since tannin makes up 25–70% of their chemical component (Adrosko 1971, 50). Mordants were widely used to fix dyes into fabric, so it is possible that the wool cloth was dyed. The lack of surviving dyestuffs in ancient textiles does not of course prove that they were never dyed.

Appendix 3.2

Methods of dye analysis, Brussels

Analysis was carried out on 3 February 1984 at the Institut Royal du Patrimoine Artistique, Parc Du Cinquantenaire 1, B-1040 Bruxelles, Belgium.

Dublin: Viking Age textiles. Sample given by Ms F. Pritchard, Department of Urban Archaeology, Museum of London. DI. 83/2812-2L/35, 66 samples.

Experimental conditions

1. *Metallic mordants (L. Maes)*

These were determined by X-ray fluorescence. The samples were first cleaned with a non-ionic detergent.

Generator: Kristalloflex 4—Siemens SRS; *Tube:* Tungsten 40 V, 30 mA, Crystal LIF.

2. *Dyes*

2.1. *Thin-layer chromatography (L. Masschelein and G. Bocque)*

2.1.1. *Dyes:* Adsorbent: 21% acetylated cellulose sheets (Schleicher and Schull F1800/2lac, ref. 355002); solvent: ethylacetate, tetrahydrofuran, water (5/35/45); detection reagent: 2-amioethyl diphenylborate (Fluka ref. 42810) 1% in methanol (see Masschelein-Kleiner 1967)

2.1.2. *Tannins:* Adsorbent: silicagel sheets (Merck 60F254); solvent: ethylacetate, chloroform, formic acid (4/5/1); detection reagent: as for 2.1.1. (see Masschelein-Kleiner *et al.* 1981).

2.2. *Detection of indigo*

Test with hydrosulfite (+ NeOH): when indigo is present it is transformed into yellowish leucoindigo. Blue indigo is then formed again by oxydation with the air.

2.3. *High-pressure liquid chromatography (J. Wouters)*

Samples where presence of madder was supposed were analysed by high-pressure liquid chromatography. A reversed phase column was eluted with a mixture of methanol and formic acid at room temperature. Detection occurred at 255nm. All the samples were too small to make quantitative analysis and to calculate relative ratios of alizarin and purpurin.

Conclusion

Most woollen samples are mordanted with iron. Madder was found in five silk threads, but the samples were too small to measure the ratio of alizarin/purpurin. Ellagic acid indicates that tannins are present, but it is not possible to specify its plant origin. Indigo could not be detected.

[The textiles analysed at Brussels were: *Wool:* DHC1, DHC5, DHC16, DHC19, DHC21, DHC22, DHC30, DHC35, DHC42, DHC48, DHC50, DHC55, DHC56, DHC57. *Silk:* DHC8, DHC9, DHC10, DHC11, DHC13, DHC24b, DHC26, DHC40.]

Appendix 3.3

Methods of dye analysis, York

Analysis was carried out on 8 July 1983 at the York Archaeological Trust Conservation Laboratory, by Penelope Walton Rogers.

Dye samples were tested by extracting the dye with a variety of solvent systems, i.e. pyridine + H₂O, ether and ethanol/10% aqueous sulphuric acid. The resulting extracts were run on a Perkin-Elmer 402 U-V/visible spectro-photometer and the spectra obtained compared with known dyestuffs.

[The textiles analysed at York were: *Wool*: DHC23. *Silk*: DHC12, DHC17, DHC25.]

Appendix 4

Analysis using Munsell Color Charts of textile colours

Wool cloth

All 41 wool pieces were rated as Yellow-Red Hue (YR) on the Munsell Colour Chart, but with variations in the balance between yellow and red.¹ The greatest amount of yellow is indicated by the designation 10YR, the least by 2.5YR. The sample divided into the following percentages:

10YR	17%
7.5YR	10%
5YR	61%
2.5YR	7%
N (no hue, zero chroma)	5%

The majority of pieces (61%), therefore, fall in the middle of the yellow-red range, and they have colour values at the darker end of the scale. Here the verbal colour designations (following Munsell) are Dark Reddish Brown (20 pieces), Very Dark Grey (1) Black (4). 17% of the pieces were graded 10YR, with the highest yellow content in this range. Colour descriptions were Very Dark Greyish Brown (2) Very Dark Brown (3) and Black (2). 7% were graded two and a half points higher towards the red end of the range at 2.5YR. These were four pieces whose verbal description was Very Dusky Red. 10% were graded at 7.5YR with two and a half points more yellow in their make-up than the mid-range, 5YR group. The verbal colour description of these three pieces is Dark Brown. Two pieces (5%) were described as N Black, i.e. with zero chroma and no hue as N2/0.

The textiles all scored in the lower half of the hue value ranges, with the highest value being 3/4 and the lowest 2.5/1. The relative darkness of the hue values may well be due to deposition in soil. The two pieces that were measured as being without chroma and hue, DHC19 and DHC21, are of a different texture from the other pieces in that they are springy to the touch and appear to be carbonised. Certainly they have lost the normal resilience of a wool textile.

Z/Z twist silk cloth

Of this group of eleven silk pieces the measurements of hue were as follows:

10YR	9%
5YR	64%
2.5YR	27%

The verbal colour descriptions are as follows: in the 10YR group (high yellow value) there was one piece of Dark Yellowish Brown with a Hue/Chroma value of 4/6. Most of the pieces were measured from the YR sheet with equal values of yellow and red in their composition. Of this group, three were described as Reddish Brown, three as Dark Reddish Brown and one as Dark Reddish Grey.

The third category in the Z/Z textiles is the 2.5YR hue, which has 2.5 more red in its composition than the 5YR category. Three pieces are described, respectively, as Reddish Brown, Dark Reddish Brown and Very Dusky Red. These Z/Z pieces have hue value scores from darker values of 2.5 to lighter values of 4, coupled with chroma values of 2 to 6. This group includes four silks that show signs of dyestuffs:

<i>Number</i>	<i>Dye</i>	<i>Munsell Chart category</i>
DHC17	Lichen purple	2.5YR 4/4
DHC8	Alizarin (madder)	5YR 4/3
DHC25	Alizarin (madder)	5YR 2.5/2
DHC12	Indigotin? (woad)	10YR 4/6

1 One item, DHC32, is a cap and patch. DHC32a and DHC32b were given separate Munsell evaluations.

The reading of 10YR for DHC12 is the only Z/Z silk showing such a high yellow content and such high value/chroma readings. Whether this should be linked to the possible indigotin dyestuff is an open question.

Although no traces of dye were detected on DHC11 the visual Munsell coding is Very Dusky Red, and a red rosy tint is still apparent. It is interesting that under the microscope the weft picks are gold and the warp ends dark brown. This is the only piece where the warp and weft systems appear to be different colours.

Z/no twist silk cloth

This group consists of twelve pieces whose hue measurements are as follows:

2.5YR	8%
10YR	42%
2.5YR	50%

DHC60 is categorised by the 2.5YR reading. The verbal colour description is Dark Reddish Brown. Visually this piece gives a clear impression of a red colouring. It is unlike the others in this group, which have a higher yellow content. Here the 10YR pieces are described as Brown (2), Dark Yellowish Brown (4) and Dark Brown (2). Six pieces have no red colour detectable on the charts and are described as Light Olive Brown (2) and Olive Brown (4). The hue values for the whole group are between 3 and 5, and the chroma between 3 and 4. No dye analysis was carried out.

Cloth made from no-twist yarn

The verbal descriptions of these pieces are Yellowish Brown, Brown, Dark Brown and Very Dark Greyish Brown. All scored on the 10YR sheet, which shows a range of yellow deepening to brown and greyish brown. None displays any of the pink or red shades found in the Z/Z silks or the wool pieces.

Appendix 5

Hair and residues found in textiles

During examination of the textiles, broken hairs could be seen caught in them with a distinctly different look from the fibres of the woven cloth. It was decided to establish whether these were human hairs. If so it would provide corroboration for the use of the cloth as head or neck coverings, even where this was not readily to be seen.

David Patrick Sleeman and Hugh Doran of the Department of Zoology, University College, Cork, examined these hairs.

Thirty-four pieces from Fishamble Street and John's Lane had suspected hairs and residues caught in them. Of the samples examined six contained enough intact hairs to attempt identification. Three of these (DHC16, DHC43 and DHC54) were sufficiently well preserved to be found to be human hair.

The three textile pieces with proven human hair are not sewn into caps, nor are they large enough to be seen to be scarves, so it is important to have shown that they too were used on or near the head. DHC43 is a badly fragmented piece now in eleven parts, but it looks as if it may have had a minimum original length of 500mm and a minimum width of c. 150mm. There is also a possible patch found with the item. The size of this textile is consistent with the caps, and so it is legitimate on the evidence of the hairs to suggest that this was a cap.

DHC54 is a scrap of hemmed and folded fabric (c. 110mm × 30mm when unfolded) of the typical light open weave. The identification of the hairs lends weight to the proposition that such small pieces may also represent parts of headcoverings.

DHC16 has minimum original dimensions of 220mm × 170mm but has no selvages and just one stitch remaining. It may be part of a scarf or perhaps a cap.

Report from the Department of Zoology, University College, Cork

Hair samples found on silk and wool textiles

David Patrick Sleeman and Hugh Doran

The following Fishamble Street/John's Lane pieces had hairs and residues caught in them: DHC1, DHC2, DHC3, DHC4, DHC5, DHC6, DHC7, DHC8, DHC9, DHC10, DHC13, DHC14, DHC15, DHC16, DHC18, DHC20, DHC21, DHC22, DHC24, DHC25, DHC26, DHC28, DHC32, DHC33, DHC34, DHC43, DHC46, DHC49, DHC54, DHC55, DHC57, DHC58, DHC59, DHC61.

The hair samples were all examined under a binocular microscope. Mammals have two basic layers of hair: under-fur and guard hairs. Wild mammals can be identified only if guard hairs are present. Human hair is somewhat different and does not contain what could be called guard hairs. Human hair is uniform in width, straight, and usually without the tiny curves found in many animal hairs.

Sufficient hairs to attempt identification were found in six samples; this hair, or suspected hair, was then cleaned in carbon tetrachloride, then mounted in alcohol to be measured and studied. The hair was then embedded in gelatine-smear slides so that the scale patterns of the hair would be preserved.

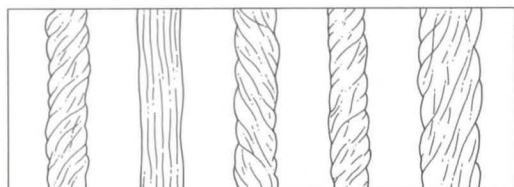
All the hairs were reddish in colour; this is probably a result of staining rather than being the original colour. This is also true of other hair found at Wood Quay and Emlagh Bog, Co. Kerry (Shee and O'Kelly 1996). The width, overall shape and scale pattern would indicate that the hair samples from DHC16, DHC43 and DHC54 are human hair or a very similar substance. This is also true of other hairs examined from Wood Quay and Emlagh Bog.

The only suspected animal hair found was in DHC20. It was very wide, with many tiny curves, and it had had a different medulla from that found in the human and other hair samples examined here. This sample was felt to be hair from a sheep *Ovis spp.*—i.e. wool.

Glossary

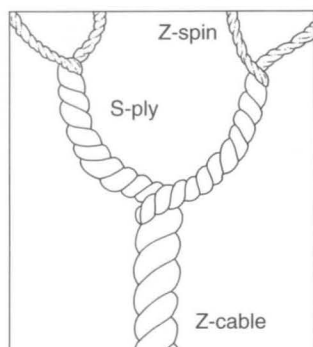
BEAT UP (verb)	To press the weft threads, after insertion into the shed, firmly against the cloth already woven. This can be done with a comb, a reed, a pin-beater or a weaving sword/batten.
BEETLE	A wooden mallet used in finishing cloth.
BINDING SYSTEM	The weave used to make cloth.
BOLT (of cloth)	A roll of cloth of definite measure.
BROCADE (verb)	To weave with a supplementary brocading weft introduced into a ground weave to create a pattern.
CABLE (verb)	To twist sets of yarn that have already been plied (cf.) into a strong cord.
COMB (wool)	Tool used to prepare wool for spinning into smooth, even thread by drawing fibres parallel to each other through the teeth.
COMB (beater)	A comb used to beat up weft threads.
COMBED (yarn)	Wool fibres that are combed so that they lie parallel to each other creating a smooth strong yarn.
CORDED HEM	Hem finished by sewing on a separate cord.
CRÊPE	Thin gauze-like silk cloth with over-twisted yarn giving increased elasticity and creating a rippled effect.
DARNING	Reinforcing a worn fabric, mending a tear, repairing a hole.
DART	A stitched fabric fold that shapes cloth around curves.
END	Individual warp thread.
FLAT-FELL SEAM (OR RUN AND FELL SEAM)	Seam in which two pieces of cloth are joined together, with one cloth edge trimmed more than the other so that the latter can be turned over and stitched down to give a flat finished seam.
FLOSS	Silk waste from the outer part of the cocoon, forming soft, untwisted, fine threads.
FULL (verb)	To thicken and condense cloth after weaving by washing to induce shrinkage.
GATHER (verb)	To insert one or two lines of threads along the cloth edge and then bunch together the cloth by pulling the threads from the side to create fullness.
GAUZE	Cloth in which binding is achieved by the displacement of warp ends, generally producing an open weave.
HEADING	The arrangement of the warp ends onto the loom to form the beginning of a piece of cloth.
HEM	Finished edge of cloth formed by folding back a raw edge.
HEM-STITCH	Slanting stitch to finish folded raw edge and hold it in place.
LOOM	See TWO-BEAM VERTICAL LOOM. See WARP-WEIGHTED LOOM.
LOOM-PIECE	Complete piece of cloth as it comes from the loom.
LOOM-WEIGHTS	Matched sets of holed stones or baked clay pieces attached to the warp ends on warp-weighted loom to provide the requisite tension.
MITRE (verb/noun)	Method of folding, sewing and cutting excess cloth from corner of textile to achieve a neat finish.
MORDANT	A reagent, such as alum, used to fix dyes in textiles, leather or other materials.
OVER-CAST (verb)	To finish edges of cloth with slanting stitches.
OVER-SEW (verb)	To join edges of cloth with short slanted stitches.
PICK	A single pass of one or more weft threads through the shed; also describes the actual weft thread.
PIECING	Sewing two or more pieces of cloth together when more width or length is needed.

LIE OF FIBRES IN A YARN

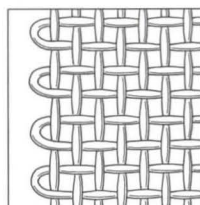


Z No twist S Tight Loose

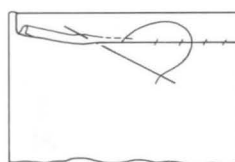
SPINNING, PLYING & CABLING



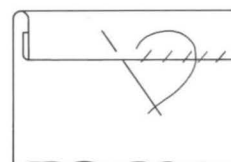
TABBY WEAVE



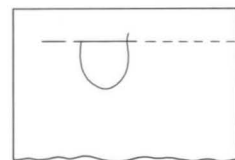
STITCHES



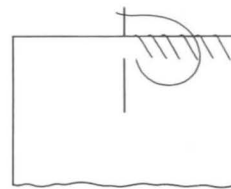
Slip-stitch



Hemming stitch

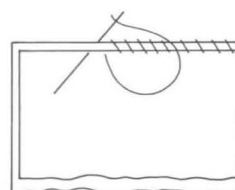


Running stitch



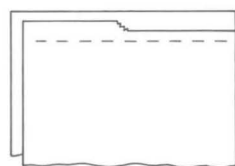
Overcast stitch

SEAMS

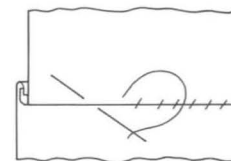


Selvages joined (oversewing)

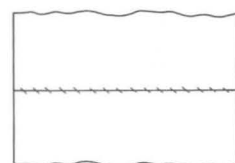
FLAT-FELL SEAM



1: Two pieces of cloth placed right sides together, sewn and then the inside of the seam cut away

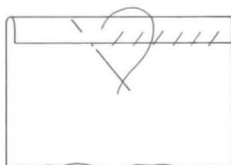


2: Edges double-folded down and secured by hemming

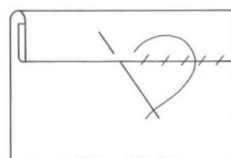


3: Cloth then opened out flat and used as one piece

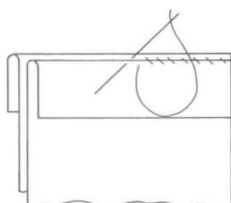
HEMS



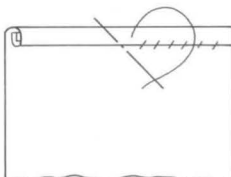
Single-folded hem



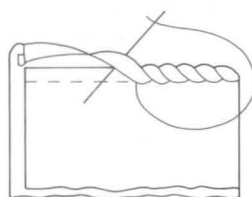
Double-folded hem



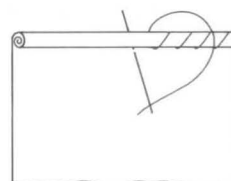
Two hems oversewn together



Rolled hem

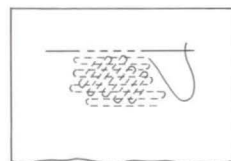


Rolled-edge whipping

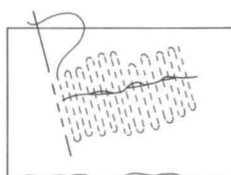


Half-whipped rolled hem

DARNING

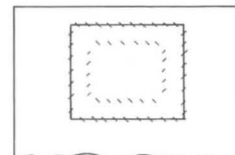


Darning a worn area (reinforcement)

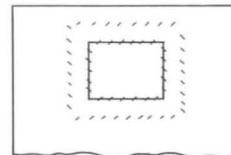


Darning a tear

PATCHING



Right side



Wrong side

Diagrams illustrating selected entries in the Glossary (from Morrell [1989] (after British Standard 3870, 'Stitches and Seams'), reproduced with kind permission of the Archaeological Textiles Newsletter).

PIN-BEATER	A pointed tool made of wood or bone for beating up the weft system on the loom.
PINCH-PLEAT	Cloth is pinched and folded into regular pleats to give fullness and shape to garment.
PLY (verb), PLIED	To double and twist already spun threads together to make a single, thicker yarn. The direction of the twist is usually opposite to that of the spinning.
REED	Rod that is used for beating up the weft system.
ROLLED HEM	Hem made by rolling the edge of the cloth between two fingers and catching it down with stitches.
SEAM	The joined line made by sewing together two or more pieces of cloth, or the stitching line of a fold in a single fabric piece, as in a dart.
SELVEDGES	The two lengthwise edges of a textile, closed by weft loops. They may have warp ends and/or a binding different from the body of the textile.
SHED	The angle made by the separation of the warp ends to form an opening for the weft picks to weave through to make a row of cloth.
SLIP-STITCH	A small slanting stitch to join cloth together.
SPIN (verb)	To twist together short fibres other than silk filaments (cf. TWIST) into a continuous thread.
SPINDLE	A short stick on which fibres are twisted to create spin and stability.
SPINDLE WHORL	Holed weight made of clay, stone, wood, bone or ivory. The whorl fits on the end of the spindle and adds extra mobility. Size and weight are determined by the specific fibre used, the end product required and the method of handling the spindle.
S/S, Z/Z	Terminology to denote both warp and weft having been spun or twisted in the same direction. Cf. S-SPIN and Z-SPIN.
STAPLE	The natural tuft or lock of wool as it comes from the sheep.
S-SPIN or S-TWIST	Definition of spin or twist using the convention of following the direction of the central bar of the letter S, thus denoting an anti-clockwise direction in the yarn (cf. Z-SPIN or Z-TWIST).
SWORD-BEATER	A flat or blade-like tool made of wood, iron or bone, used for beating up the weft on simple looms.
SYSTEM	Either the warp ends or the weft picks in a weave.
TABBY	A basic plain weave: each pick passes under one warp end, then over one, in the weft system.
TABLET	Thin flat piece of wood, bone or other material with holes pierced into it, used for weaving narrow bands. Tablets are mostly square but may be triangular or other shapes.
TABLET WEAVING	A type of narrow weaving where a warp-patterned band of cloth or cord is created by twisting holed tablets or cards through which the warp ends are threaded whilst the weft picks are woven through them. The tablets are rotated singly or in groups so that a shed is created through which the weft threads can pass.
TAPESTRY	A type of weave with one warp and different coloured weft picks. These are decorative weft threads that cover only the areas needed by the pattern and so do not pass from selvedge to selvedge.
TWILL	Weave created by the weft system crossing over two or more warp ends, and continuing under one or more. In the next row the sequence begins one warp end over thus creating a diagonal pattern in the cloth. 2/1 TWILL is a weave in which the weft system crosses over two warp ends and

	under one. In 2/2 TWILL the weft picks pass over two warp ends and then under two.
TWIST (verb)	A description given to the process of making silk thread rather than 'to spin'. Cultivated silk thread is not spun because it is reeled off the cocoon in long unbroken filaments and needs only to be twisted.
UPRIGHT TWO-BEAM LOOM	Any loom with the warp held in an upright position between two beams. There are many types including large, small and tapestry looms.
WARP	The system of threads that runs from top to bottom or from front to back on the loom. The warp ends are the individual warp threads.
WARP-WEIGHTED LOOM	More or less upright loom in which the warp ends hang down from an upper bar. The necessary tension to achieve the weave is gained by weighting the warp ends with balanced sets of weights (see LOOM-WEIGHTS).
WEFT	The system of threads that runs from side to side on the loom. The weft picks are the individual weft threads.
WEFT-FACED COMPOUND TWILL	A type of twill weave with two warp systems (a main warp and a binding warp) and two or more weft systems composed of two or more series of yarns. The warp ends are covered completely by the weft systems; hence the description 'weft-faced'.
WHIP-STITCH (verb)	To over-sew a rolled or raw edge with slanting stitches.
WHORL	See SPINDLE WHORL.
WOOLLEN (yarn)	In general terms, any yarn spun from wool. As specified in technical terms it is wool that has been carded (prepared for spinning by being drawn through a pair of hand cards fitted with many fine wires) into 'woolly' yarn rather than smooth-combed wool fibres that all lie parallel.
Z-SPIN or Z-TWIST	Definition of spin or twist using the convention of following the direction of the central bar of the letter Z, thus denoting a clockwise direction in the yarn (cf. S-SPIN or S-TWIST).

(For more detailed definitions see Burnham 1980 and Morrell [1989])

References

- Achkasova, V.M. and Totskova I.F. 1986 *St. Sophia Cathedral in Kiev*. Mistetstvo Publishers.
- Adrosko, R. 1971 *Natural dyes and home dyeing*. New York. Dover.
- Andersson, A. and Franzén, A.M. 1975 Birgittareliker. *Antikvariskt Archiv* **59**, 5–60. Kungliga Vitterhets Historie och Antikvitets Akademien. Stockholm. Almqvist and Wiksell International.
- Andersson, E. 2003 *Tools for textile production from Birka and Hedeby*. Birka Studies 8. Stockholm. Birka Project for Riksantikvarieämbetet och Statens historiska museer.
- Arbman, H. 1943 *Birka: Untersuchungen und Studien—I. Die Gräber: Tafeln*. Uppsala. Kungliga Vitterhets Historie och Antikvitets Akademien.
- Barraclough, G. 1980 *The Times atlas of world history*. London. Times Books.
- Batey, C. 1987 The female Viking grave at Kneep and its wider significance. *Proceedings of the Society of Antiquaries of Scotland* **117**, 168–71.
- Bender Jørgensen, L. 1986 *Forhistoriske tekstiler i Skandinavien, Nordiske fortidsminder*, serie B, bind 9. Copenhagen. Det Kongelige Nordiske Oldskriftselskab.
- Bender Jørgensen, L. 1987 A Coptic tapestry and other textile remains from the royal Frankish graves of Cologne Cathedral. *Acta Archaeologica* **56**, 85–100.
- Bender Jørgensen, L. 1992 *Northern European textiles until AD 1000*. Aarhus University Press.
- Bing, V. and von Ueberfeldt, B. 1978 *Nederlandsche Kleederdragten*. Zutphen. Uitgeverij Terra.
- Brønsted, J. 1980 *The Vikings*. Harmondsworth. Penguin.
- Bruce-Mitford, R. 1978 *The Sutton Hoo ship-burial—2: arms, armour and regalia*. London. British Museum Press.
- Bullough, D. 1965 After Charlemagne: the empire under the Ottonians. In D. Talbot Rice (ed.), *The dawn of European civilization*, 299–326. New York. McGraw Hill.
- Burnham, D. 1973 *Cut my cote*. Toronto. Royal Museum Ontario.
- Burnham, D. 1980 *A textile terminology: warp and weft*. London and Henley. Routledge and Kegan Paul.
- Coffey, G. and Armstrong, E.C.R. 1910 Scandinavian objects found at Islandbridge and Kilmainham. *Proceedings of the Royal Irish Academy* **28**, 107–22.
- Collingwood, P. 1982 Historical textiles. In A. Jackson (ed.), *The craft of the weaver*, 135–50. London. British Broadcasting Corporation.
- Crossley-Holland, K. 1980 *The Norse myths*. Harmondsworth. Penguin.
- Crowfoot, E. and Hawkes, S.C. 1967 Early Anglo-Saxon gold braids. *Medieval Archaeology* **11**, 42–86.
- Dodwell, C. 1982 *Anglo-Saxon art*. Manchester University Press.
- Doherty, C. 1980 Exchange and trade in early medieval Ireland. *Journal of the Royal Society of Antiquaries of Ireland* **110**, 67–89.
- Eastwood, G. 1983 A medieval face veil from Egypt. *Costume* **17**, 33–8.
- Edwards, N. 1996 *The archaeology of early medieval Ireland*. London. Batsford.
- Fentz, M. 1998 En hørskjorte fra 1000-arene. In J. Hjeremind, M. Iversen and H. Krongaard Kristensen (eds), *Viborg Søndersø 1000–1300: Byarkæologiske undersøgelser 1981 og 1984–85*, 249–66. Højbjerg and Århus. Jysk Arkæologisk Selskab/Aarhus Universitetsforlag.
- Formaggio, D. and Basso, C. 1962 *A book of miniatures*. New York. Tudor Publishing.
- Franzén, A.M and Geijer, A. 1968 Textile finds from excavations in Swedish towns 1960–66: a preliminary report. In R. Blomqvist (ed.), *Res Mediaevalis Archaeologica Lundensia* **3**, 130–3.
- Gaimster, D.R.M., Margeson, S. and Hurley, M. 1990 Medieval Britain and Ireland in 1989. *Medieval Archaeology* **34**, 162–252.
- Gantz, J. 1983 *Early Irish myths and sagas*. Harmondsworth. Penguin.
- Geijer, A. 1938 *Birka III. Die Textilfunde aus den Gräbern*. Uppsala. Almqvist and Wiksell International.

- Geijer, A. 1979 *A history of textile art*. London. Pasold Research Fund/Sotheby Parke Bernet.
- Geijer, A. 1980 The textile finds from Birka. *Acta Archaeologica* **50**, 209–22.
- Geraghty, S. 1996 *Viking Dublin: botanical evidence from Fishamble Street*. Medieval Dublin excavations 1962–81, Ser. C, vol. 2. Dublin. Royal Irish Academy.
- Gibbs-Smith, C.H. 1973 *The Bayeux tapestry*. London. Phaidon.
- Hägg, I. 1982 Einige Bemerkungen über der Birkatracht. In L. Bender Jørgensen and K. Tidow (eds), *Textilsymposium Neumünster: Archäologische Textilfunde*, Northern European Symposium on Archaeological Textiles (Proceedings) 1, 249–65. Neumünster. Textilmuseum Neumünster.
- Hägg, I. 1988 Textilfunde als Spiegel der Gesellschaft: Erwägungen über das Beispiel Haithabu. In L. Bender Jørgensen, B. Magnus and E. Munksgaard (eds), *Archaeological textiles*, Northern European Symposium on Archaeological Textiles (Proceedings) 2, 187–96. Copenhagen. Arkaeologisk Institut, Copenhagen University.
- Hägg, I. 1991 *Die textilfunde aus der Siedlung und aus den Gräbern von Haithabu. Berichte über die Ausgrabungen in Haithabu*, Bericht 29. Neumünster. Karl Wachholtz.
- Hald, M. 1980 *Ancient Danish textiles from bogs and burials*. Copenhagen. National Museum of Denmark.
- Hall, A.R. 1997 Plants used in dyeing and mordanting. In P. Walton Rogers, *Textile production at 16–22 Coppergate—the archaeology of York: the small finds 17/11, 1767–9*. York. York Archaeological Trust/Council for British Archaeology.
- Hall, A.R., Tomlinson, P.R., Hall, R.A., Taylor, G.W. and Walton, P. 1984 Dyeplants from Viking York. *Antiquity* **58**, 58–60.
- Hall, R. 1984 *The Viking dig*. London. Bodley Head.
- Harbison, P. 1992 *The High Crosses of Ireland: an iconographical and photographic survey*. 3 vols. Bonn. Habett.
- Hedeager Krag, A. 1998 Dress and power in prehistoric Scandinavia, c. 550–1050 AD. In L. Bender Jørgensen and C. Rinaldo (eds), *Textiles in European archaeology*, Northern European Symposium on Archaeological Textiles (Proceedings) 6, GOTARC series A, vol. 1, 125–9. Göteborg. Department of Archaeology, Göteborg University.
- Henry, F. 1952 A wooden hut on Inishkea North, Co. Mayo. *Journal of the Royal Society of Antiquaries of Ireland* **82**, 163–78.
- Henry, P. 1998 Textiles as indices of late Saxon social dynamics. In L. Bender Jørgensen and C. Rinaldo (eds), *Textiles in European archaeology*, Northern European Symposium on Archaeological Textiles (Proceedings) 6, GOTARC series A, vol. 1, 157–66. Göteborg. Department of Archaeology, Göteborg University.
- Hofenk de Graaff, J. 1983 The chemistry of red dyestuffs in medieval and early modern Europe. In N. Harte and K. Ponting (eds), *Cloth and clothing in medieval Europe*, 71–9. London. Heinemann.
- Hoffmann, M. 1974 *The warp-weighted loom*. Oslo. Robin and Russ Handweavers.
- Hunt, J. 1974 *Medieval figure sculpture 1200–1600*, vol. 1. 2 vols. Dublin and London. Irish University Press/Sotheby Parke Bernet.
- Hussey, J.M. 1965 The Byzantine world of the ninth and tenth centuries. In D. Talbot Rice (ed.), *The dawn of European civilization*, 113–38. New York. McGraw Hill.
- Ingstad, A. 1982 The functional textiles from the Oseberg ship. In L. Bender Jørgensen and K. Tidow (eds), *Textilsymposium Neumünster: Archäologische Textilfunde*, Northern European Symposium on Archaeological Textiles (Proceedings) 1, 85–96. Neumünster. Textilmuseum Neumünster.
- Ingstad, A. 1988 Textiles from Oseberg, Gokstad and Kaupang. In L. Bender Jørgensen, B. Magnus and E. Munksgaard (eds), *Archaeological textiles in northern Europe*, Northern European Symposium on Archaeological Textiles (Proceedings) 2, 133–48. Copenhagen. Arkaeologisk Institut, Copenhagen University.
- Jankuhn, H. 1982 Trade and settlement in central and northern Europe up to and during the Viking period. *Journal of the Royal Society of Antiquaries of Ireland* **112**, 18–50.
- Joyce, P.W. 1903 *A social history of ancient Ireland*. London. Longman Green.

- European Symposium on Archaeological Textiles (Proceedings) 2, 149–61. Copenhagen. Archaeologisk Institut, Copenhagen University.
- Pritchard, F. 1992 Aspects of the wool textiles from Viking age Dublin. In L. Bender Jørgensen (ed.), *Archaeological textiles in northern Europe*, Northern European Symposium on Archaeological Textiles (Proceedings) 4 (Tidens Tand 5), 93–104. Copenhagen. Kongelige Danske Kunstakademi.
- Purhonen, P., Söyrinki-Harmo, L., Tomanterä, L., Aav, M., Masala, S-L. and Johansson, K. 1985 'Ken kantaa Kalevalaa': a pageant of ancient Finnish dress, 1835 Kalevala 1985. Kalevala. Finnish National Board of Antiquities and Historical Monuments/Kalevala Koru Oy.
- Pytlewicz, M. 1998 Polish textiles from coin hoards of the 10th–middle 17th centuries. In L. Bender Jørgensen and C. Rinaldo (eds), *Textiles in European archaeology*, Northern European Symposium on Archaeological Textiles (Proceedings) 6, GOTARC series A, vol. 1, 265–70. Göteborg. Department of Archaeology, Göteborg University.
- Randsborg, K. 1980 *The Viking age in Denmark*. London. Duckworth.
- Rybina, E. 1992 Trade links of Novgorod established through archaeological data. In M. Brisbane (ed.), *The archaeology of Novgorod, Russia*. Monograph series 13. Lincoln. Society for Medieval Archaeology.
- Ryder, M. 1983 *Sheep and man*. London. Duckworth.
- Schlabow, K. 1974 Vor- und frühgeschichtliche Textilefunde aus den nördlichen Niederlanden. *Paleohistoria* 16, 169–221.
- Schmedding, B. 1978 *Mittelalterliche Textilien in Kirchen und Klöstern der Schweiz*. Berne. Abegg Stiftung.
- Shee, E. and O'Kelly, M.J. 1996 A clothed burial from Emlagh, near Dingle, Co. Kerry. *Journal of the Cork Historical and Archaeological Society* 81, 81–91.
- Shepard, J. 1995 Constantinople, gateway to the north: the Russians. In C. Mango and G. Dagron (eds), *Constantinople and its hinterland*, 243–60. Aldershot. Variorum, Ashgate Publishing.
- Sinclair, R. 1982 Colour specification and colour fading. In H. Dalrymple (ed.), *Dyes on historical and archaeological textiles*, 7–8. Edinburgh. National Museum of Antiquities of Scotland.
- Skinner, F. 1967 *Weights and measures*. London. Her Majesty's Stationery Office.
- Šroňková, O. 1954 *Gothic fashions in women's dress*. Prague. Artia.
- Start, L. 1950 Textiles. In H. Hencken, 'Lagore Crannog', *Proceedings of the Royal Irish Academy* 53C, 1–247: 203–24.
- Stratford, N. 1997 *The Lewis chessmen and the enigma of the hoard*. London. British Museum Press.
- Synge, L. 1982 *Antique needlework*. Poole. Blandford Press.
- Taylor, G. 1982 Detection and identification of dyes on Anglo-Scandinavian textiles. In H. Dalrymple (ed.), *Dyes on historical and archaeological textiles*, 5. Edinburgh. National Museum of Antiquities of Scotland.
- Wallace, P. 1984 A reappraisal of the archaeological significance of Wood Quay. In J. Bradley (ed.), *Viking Dublin exposed*, 112–33. Dublin. O'Brien Press.
- Wallace, P. 1985 The archaeology of Viking Dublin. In H.B. Clarke and A. Simms (eds), *The comparative history of urban origins in non-Roman Europe*, 103–45. British Archaeological Reports (International Series) 255. Oxford. British Archaeological Reports.
- Wallace, P. 1986 The English presence in Viking Dublin. In M.A.S. Blackburn (ed.), *Anglo-Saxon monetary history*, 201–21. Leicester University Press.
- Wallace, P. 1987 The economy and commerce of Viking Age Dublin. In K. Düwel, H. Jankuhn, H. Siems and D. Timpe (eds), *Untersuchungen zu Handel und Verkehr der vor- und frühgeschichtlichen Zeit in Mittel- und Nordeuropa*, 200–45. Göttingen. Vandenhoeck & Ruprecht.
- Wallace, P. 1992 *The Viking Age buildings of Dublin*. Medieval Dublin excavations 1962–81, Ser. A, vol. 1. Dublin. Royal Irish Academy.
- Walton, P. 1989 *Textiles, cordage and raw fibre from 16–22 Coppergate—The archaeology of York: the small finds 17/5*. London. Council for British Archaeology.

1. Walton Rogers, P. 1997 *Textile production at 16–22 Coppergate—The archaeology of York: the small finds 17/11*. York. York Archaeological Trust/Council for British Archaeology.
- er
- an
4. Webb, D., Parnell, J. and Doogue, D. 1977 *An Irish flora*. Dundalk. Dundalgan Press.
- n,
- 35 Wincott Heckett, E. 1997 Textiles, cordage, basketry and raw fibre. In M. Hurley and O. Scully with S. McCutcheon (eds), *Late Viking Age and medieval Waterford excavations 1986–1992*, 743–61. Waterford. Waterford Corporation.
- al Wincott Heckett, E. forthcoming (a) The textiles. In D. Murtagh (ed.), *A Viking pit, High Street, Dublin*.
- s. Wincott Heckett, E. forthcoming (b) The textiles. In C. Lynn (ed.), *An early Christian habitation site, Deer Park Farms, Co. Antrim*.
- y,
- 5, Wyrozumski, J. 1983 The textile trade of Poland in the middle ages. In N. Harte and K. Ponting (eds), *Cloth and clothing in medieval Europe*, 248–58. London. Heinemann.
- g

Concordance of excavation sample numbers

<i>New sample number</i>	<i>Excavation sample number</i>	<i>New sample number</i>	<i>Excavation sample number</i>
1	E172:7672	32	E172:10540
2	E172:11051	33	E172:11205
3	E172:12587	34	E172:14499
4	E172:13535	35	E190:7431
5	E172:13697	36	E173:4253
6	E172:13714	37	E172:10959
7	E172:14623	38	E172:12831
8	E172:12397	39	E172:13590
9	E172:12551	40	E172:14370
10	E172:13396	41	E172:11066
11	E172:14407	42	E172:13241
12	E172:15348	43	E172:11171
13	E190:3541	44	E476:2926A
14	E172:10580	45	E476:2447
15	E172:13780	46	E172:3393
16	E190:7524	47	E172:8176
17	E172:9115	48	E172:10574
18	E172:5865	49	E172:11791
19	E190:3275	50	E172:12695
20	E190:3325	51	E172:12921
21	E190:3416	52	E172:13125
22	E190:7232	53	E172:13552
23	E173:4403	54	E172:15223
24	E172:11845	55	E190:7274
25	E172:15235	56	E190:7495
26	E190:7186	57	E190:7593
27	E172:14366	58	E172:9695
28	E172:11916	59	E172:11780
29	E172:13621	60	E190:19536
30	E172:10241	61	E190:4406
31	E172:10300		



Pl. I. *DHC1*: wool scarf



Pl. II. *DHC12*: knotted silk scarf



Pl. III. *DHC17: veil type silk scarf*



Pl. IV. *DHC24: silk headband with tie*



Pl. V. Ivory chess queens, Isle of Lewis, Scotland, twelfth century AD (reproduced with permission from the Trustees of the British Museum)



Pl. VI. Thin gold bands, Ireland and Scotland, Viking Age (reproduced with permission from the National Museum of Ireland)



Pl. VII. DHC32: wool cap



Pl. VIII. DHC40: silk cap



Pl. IX. *DHC30: wool cap*



Pl. X. *DHC33: wool cap*



Pl. XI. *DHC37: silk cap*



Pl. XII. *DHC39: silk cap*



Pl. XIII. DHC38: silk cap



Pl. XIV. DHC59: silk cloth showing sewing techniques



Pl. XV. Female figures from Öland, Sweden, ninth-tenth century AD; the smaller figure wears a headband (reproduced with permission from the Historiska Museet, Stockholm)



Pl. XVI. Wall painting of four children of Yaroslav, king of Kiev, Cathedral of St Sophia, Kiev, eleventh century AD (reproduced with permission from the Museum of St Sophia Cathedral, Kiev)

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